ANGLIA RUSKIN UNIVERSITY

FACULTY OF BUSINESS AND LAW

THE IMPLICATION OF PUBLIC DEBT AND FINANCIAL INSTABILITY ON ECONOMIC GROWTH: A CASE STUDY OF SELECTED WEST AFRICAN COUNTRIES

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A thesis in partial fulfilments of Anglia Ruskin for the degree of
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ABSTRACT

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THE IMPLICATION OF PUBLIC DEBT AND FINANCIAL INSTABILITY ON ECONOMIC GROWTH: A STUDY OF SELECTED WEST AFRICAN COUNTRIES

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This research examines the impact of public debt and financial instability on the economic growth of selected West African countries. The effect of public debt on an economy cannot be overemphasised. The amount of public debt that a country owes can either help in increasing the growth rates or it can result in situations that are detrimental to economic growth. Some scholars have argued that when public debt is not properly managed, it can be carried on to future generations by way of compound interest problems. Therefore, it is very important to know how the amount of debt country owes can affect economic activities. Financial stability on the other hand is an important aspect of the economy because most of the decisions taken by policy makers are centred around maintaining stability. This is because financial instability is disadvantageous to the economy. It results in a weakening of investment and economic activities; it leads to a rise in public debt and also affects economic growth in a negative way. The study carried out an extensive literature review on various school of thoughts on public debt and economic growth; it also identified sources of financial stability. A quantitative research approach was adopted for this study and the data was gotten from the World Development Indicators for a period starting from 1970 to 2015. The selected countries were Benin, Burkina Faso, Cote D'Ivoire, Ghana, Mali, Niger, Nigeria, Senegal and Togo. The econometric model for this study was adapted from the theories of business cycle and the statistical tests used for estimation includes the unit root test, leg length criteria, ARDL bounds test, Johansen Cointegration tests, error correction models, granger causality tests, cumulative sum tests, and serial correlation tests. The results revealed that there is a long run relationship between public debt, financial stability and economic growth for the selected West African countries, and the granger causality results mostly indicated a unidirectional causality for the selected West African countries. The results suggested that that government spending is the most effective policy instrument in regulating the level of public debt and financial instability. Based on the econometric findings, this research recommends that fiscal policy is more effective in curtailing the effects of public debt and financial instability on the economic growth of the selected countries.

Keywords: public debt, financial instability, economic growth, financial crisis

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LIST OF ABBREVIATIONS

ADF	AUGMENTED DICKEY FULLER
AfDB	AFRICAN DEVELOPMENT BANK
AGOA	AFRICAN GROWTH AND OPPORTUNITY ACT
AIC	AKAIKE INFORMATION CRITERIA
AIG	AMERICAN INTERNATIONAL GROUP
ARDL	AUTOREGRESSIVE DISTRIBUTED LAG
ARRA	AMERICAN RECOVERY AND REINVESTMENT ACT
BCEAO	BANQUE CENTRAL DES ETATS DE L'AFRIQUE DE L'OUEST
BEN	BENIN
BF	BURKINA FASO
BRICS	ACRONYM FOR A GROUP OF EMERGING ECONOMIES (BRAZIL, RUSSIA, INDIA, CHINA AND SOUTH AFRICA)
BVRM	BOURSE DES VALUERS MOBILIERES
CBN	CENTRAL BANK OF NIGERIA
CDS	CREDIT DEFAULT SWAP
CEAO	COMMUNAUTE ECONOMIQUE DES ETATS DE L'AFRIQUE DE L'OUEST
CFA	COMMUNAUTE FINANCIERE D'AFRIQUE
CIV	COTE D'IVOIRE
CGFS	THE COMMITTEE ON THE GLOBAL FINANCIAL SYSTEM
CUSUM	CUMULATIVE SUM
DBT	EXTERNAL DEBT STOCK

DMO	DEBT MANAGEMENT OFFICE
EBA	EVERYTHING BUT ARMS INITIATIVE
ECB	EUROPEAN CENTRAL BANK
ECM	ERROR CORRECTION MODEL
ECOWAS	ECONOMIC COOPERATION OF WEST AFRICAN STATES
ECOMOG	ECOWAS MONITORING GROUP
EFSF	EUROPEAN FINANCIAL STABILITY FACILITY
EFSM	THE EUROPEAN FINANCIAL STABILISATION MECHANISM
EIB	EUROPEAN INVESTMENT BANK
ELF	EMERGENCY LIQUIDITY FACILITY
EMU	EUROPEAN MONETARY UNION
EU	EUROPEAN UNION
FDI	FOREIGN DIRECT INVESTMENT
FIH	FINANCIAL INSTABILITY HYPOTHESIS
GCF	GROSS CAPITAL FORMATION
GDP	GROSS DOMESTIC PRODUCT
GFC	GLOBAL FINANCIAL CRISIS
GHN	GHANA
GNP	GROSS NATIONAL PRODUCT
GR	GROWTH RATE OF GDP
HIPC	HEAVILY INDEBTED POOR COUNTRIES
HQIC	HANNAN-QUINN INFORMATION CRITERIA
IEP	THE INSTITUTE IF ECONOMICS AND PEACE

IMF	INTERNATIONAL MONETARY FUND
IN	INFLATION
KPSS	KWIATKOWSI-PHILLIPS-SCHMIDT-SHIN TEST
MAL	MALI
MBS	MORTGAGED BACKED SECURITIES
MDRI	MULTILATERAL DEBT RELIEF INITIATIVE
M3	BROAD MONEY
NER	NIGER
NGR	NIGERIA
NSE	NIGERIAN STOCK EXCHANGE
OECD	THE ORGANISATION FOR ECONOMIC COOPERATION AND DEVELOPMENT
PP	PHILLIPS-PERRON TEST
PSC	PRIVATE SECTOR CREDIT
PX	GOVERNMENT SPENDING
QE	QUANTITATIVE EASING
RQ	RESEARCH QUESTION
SAP	STRUCTURAL ADJUSTMENT PROGRAMME
SEN	SENEGAL
SGP	STABILITY AND GROWTH PACT
SIC	SCHWARZ INFORMATION CRITERIA
SMP	SECURITIES MARKET PROGRAMME
TARP	TROUBLED ASSET RELIEF PROGRAM
TFI	TRADE FINANCE INITIATIVE
TOG	TOGO

TR	TRADE
UEMOA	UNION ECONOMIQUE ET MONETAIRE OUEST AFRICANE
U.S	UNITED STATES OF AMERICA
USA	UNITES STATES OF AMERICA
U.K	UNITED KINGDOM
VECM	VECTOR ERROR CORRECTION MODEL
WAEMU	WEST AFRICAN ECONOMIC AND MONETARY UNION

CHAPTER ONE

INTRODUCTION

1.1 OVERVIEW

The relationship between public debt and economic growth has been of constant debate over the years as there have been several unrests on numerous occasions in various economies and at different periods. The unrests such as the Great Depression of the 1930s, the Asian crisis of the 1990s, the global financial crisis and European debt crisis since 2007 are contributing factors to the relevance of this debate.

Why is the study of public debt and economic growth so important? It is important because governments and Central Banks have a number of macroeconomic objectives to achieve such as a sustainable and rising economic growth, creating employment, attaining and maintaining price stability, as well as balance of payment equilibrium. However, since the ever-present issue of scarce and limited resources persists, there is the need to find alternative means to get resources to achieve these objectives. An alternative way to get these sought after resources is to borrow from either nationals (domestic sources) or foreigners (external sources). In as much as borrowing can help a country to achieve its set objectives, it can also be a deterrent to economic growth in some cases. Cecchetti et al. (2011) describes debt as a two-edged sword because it can improve welfare, but if it is not used creatively or if it is accumulated, it can be a tragedy because it weakens the provision of welfare to the citizens.

Another reason why governments borrow is to contain external shocks such as oil price shock. If there was an unexpected oil price shock that resulted in an expansionary fiscal policy, where the focus was to increase money supply through tax cut, the government would need to borrow large sums to close the fiscal gap or deficits. However, since expansionary fiscal policy leads to an increase in a government's budget deficit, it causes a fear of default risk and raises interest rates. This rise in interest rate creates a crowding out of investment (because investors would rather invest abroad as it is cheaper and there is a lower default risk), resulting in decline in aggregate output and economic growth. In some instances, the rise in interest rate and capital flight can result in financial instability. This was the case for the Asian crisis (discussed in section 3.4.2). Other reasons why government accumulate debt include accruing principals and interests, wasteful use of the loan, unfitting macroeconomic policies, wars and political uprising among other reasons.

Furthermore, there has also been a growing alertness of the implications of financial instability on economic growth, particularly the channels by which a flawed or weakened financial sector can create or expand volatilities in the real economy. Financial activities and how they affect the real economy have developed more and more interest from policy makers since the repercussions of the global financial crisis of 2008. This has made Central Banks around the globe become keen on their involvement, including other financial intermediaries in promoting financial stability objectives. A rise in conflicting views about the causes of financial instability along with the appropriate policy response were also noticed (Chant, 2003).

Financial stability was not always a goal of Central Banks. Early banks of the late 19^{th} century such as the Riksbank of 1668 and the Bank of England of 1694 had different roles to those of modern banks. The Riksbank was founded as a government's commercial bank to take over from an unsuccessful private bank, whereas, the Bank of England was founded by the monarch to fund its expenditure. These banks were essentially founded to fund government expenditure. The Bank of England soon realised that its leading position meant that it had power over the system stability as compared to other commercial banks at that time. This seemed to have been the basis for the focus on uncontrolled financial pressures. Thus, the realisation prompted the rise of the new Central Banks of the early 20^{th} Century. The establishment of the Federal Reserve in 1913 was a consequence of several financial instabilities in the United States of America (Chant, 2003).

Financial instability can affect the workings of an economy in numerous ways. It can affect the financial institutions (such as banks and other financial intermediaries) so that they are unable to finance other aspects of the economy. It also affects nonfinancial entities (such as households, enterprises, and governments) to the point that access to finance by them becomes limited. It can start in a number of ways and it varies from country to country, year to year, or what portions of the financial system are affected and the impact of the instability (Chant, 2003). Some of ways by financial instabilities have been experienced includes bank failures and/or a sudden reduction in credit availability and trade, an exchange rate regime failure, and so on, which creates severe disruptions to the regular functioning of financial and monetary systems, and in so doing, hurts the productivity of an economy. Unfortunately, financial instabilities have occurred recurrently throughout history, and regardless of relentless efforts to eradicate them, it looks doubtful that they will not reappear in the future (Goldstein and Razin, 2015).

It is against this backdrop that this research investigates the implications of public debt and financial instability on economic growth, while discussing various theoretical and empirical literatures on the subject matter. This chapter is the introductory chapter to the thesis. It provides the background of the study discussing the issues investigated and states the research questions. The aims and objectives of the study are also made known including the type of methodology used, giving a brief explanation on why it was chosen. Finally, the chapter also provides an outline of how this thesis was structured.

1.2 BACKGROUND OF THE STUDY

As earlier stated, there have been numerous debates among financial economists about the relationship between public debt and economic growth during the past few years. Becirovic et al. (2010) suggested why this is the case is because, both public debt and economic growth can be used to interpret a government's finances. Since the gross domestic product (GDP) measures the government's tax base, a decreasing debt to GDP ratio reflects low public debt and its capability to raise tax. This situation sometimes indicates that government has a good financial management. However, the reverse is the case for a rising debt to GDP ratio; meaning that the economy is faced with high public debt and its ability to raise tax revenue is very low. An economy faced with this situation cannot sustain itself for long and could end up in a debt crisis.

Furthermore, if a government finances its debts by borrowing more, the debt problem would be carried on to future generations. The situation can also lead to a compound interest problem, which is a risk to a nation. Compound interest causes governments to get fresh loans to finance interest costs and repayment of loans, making deficit financing an incessant activity. Since budget deficit is a cumulative value that increases public debt, the rise in public debt continually leads to growing costs for loan repayment and interest costs. For example, the total debt as a result of compound interest in Germany between 1950 and 1995 grew 177fold and the GDP between the same periods grew 33fold. During 1992, the government had to pay 317million Deutsche Mark per day as interest expenditure. Again in 2005, the German budget deficit was €74.3billion and the interest expenses was €64billion (Becirovic et al., 2010). Similarly, Nigeria borrowed $5 billion in 1985 and as at year 2000, had paid about $16 billion in interest but still owed $28 billion as a result of compound interest up until 2006 where they were given debt relief.

Therefore, to curb an unending rise in public debt, steps has to be taken to ensure that there is an exponential rise in economic growth, meaning that interest rate and growth rate of GDP has to be equal. It is difficult to achieve this because of scarce resources and level of market potential. As a result of this, during a recession, government interference results in more debt accrual, as government has to bail out the private sector, like the United States government did during the financial crisis of 2008 in an attempt to revive and sustain economic growth. Further leading to more debts and repayment defaults.

Since a high level of debt cannot be prolonged for a certain duration because of its detriment to the economy, the government has to respond either by increasing taxes, reducing its spending or by raising inflation levels. Raising taxes is the first theoretical option for a country as a countermeasure for high debt levels. However, the disadvantage of this is that it can lead to capital flight as private businesses might not want to invest anymore in the country. Furthermore, tax increases are only effective in countries with a high GDP growth. The second option of cutting expenditures cannot be avoided but the effect will be felt more by the poor and those on welfare. The third option is inflation. The government can ask the Central Bank to buy its bonds and therefore get new money in the process. This new money will in the long run result in inflation. While inflation is good for the debtor because it results in a fall of the real value of the debt, on the other hand, it can cause a fall in the total savings level due to higher price level and a high hoarding level as a result of a lower interest rate.

Therefore, if the Central Bank wants financial institutions to attract additional savings, they would have to raise the real interest rate which would now cause a redistribution of wealth from lower-income groups to high-income groups. All three options with the exclusion of tax increase would be beneficial to the rich. Therefore, in the long run, wealth will be concentrated in the hands of a few (Becirovic et al., 2010).

In a situation whereby, there is an external shock to the economy, the higher the debt level of a country, the more difficult repayment will be. The shock might be a minor one, but high indebted countries would be affected and no longer be seen as credible or trustworthy. Hence, when creditors refuse to lend because of the aforementioned circumstance, consumption and investment drops. In essence, the greater the debt level of a country during an external shock, the higher the effect of that shock to the economy.

Furthermore, the greater the negative effect of shocks to economic activities, the more the likelihood of debtors not repaying their debt. This is because high level of public debts increases interest rate and inflation levels, leading to financial instability and finally, decreasing the rate of economic growth. Therefore, the level of public debt can be the difference between having a stable economy with low inflation, rising economic growth, financial stability and an unstable economy with a high rate of volatility, a high rate of inflation and financial instability.

Experience has shown that high debt rate or rising debt is a problem or should be of concern to the economy. This can be justified with the recent financial crisis of 2008 that began with the housing market burst in the United States. The severity of the global financial crisis of 2008 put some financial strains on public finances across the globe. Generally, there were huge deficits and rise in public debt as growth declined in many countries. The European Area was also highly prone to the crisis which led to financial instability and reduction in GDP during that period. In 2010, the Eurozone was faced with a serious sovereign debt crisis and some states in this zone amassed an unmaintainable rate of government debt as three countries Greece, Ireland and Portugal had to get loans from other neighbouring countries and the IMF to prevent non-payment of their debt with this crisis later expanding to Italy and Spain (Nelson et al., 2011; Gorea and Radev, 2014). As estimated by the International Monetary Fund (IMF) in 2012, the level of public debt as a ratio of GDP for developed countries rose from 75% to 100% in 2011 and this level had not been seen since World War II (Cherif and Hasanov, 2012).

Public debt is also seen as one of the tools used for deficit financing for bridging financial gaps that have occurred in the economy. The economy is affected by public debt through the connection between fiscal deficits and investments. This is because a large fiscal deficit leads to an increase in government borrowing. Consequently, it limits and causes a restriction in capital resources, that in turn raises the cost of capital and hence interest rate. During a boom, financial institutions are highly vulnerable to the government policies, because government bonds have a low default risk. However, during a recession, the reverse is the case and it becomes difficult to maintain government assets, subsequently leading to unfavourable growths in both real and financial sectors.

1.3 RELATIONSHIP BETWEEN DEBT AND GROWTH

There has not been a definitive answer to the relationship between debt and growth. Findings of various researchers seem to differ from each other, for instance, Reinhart and Rogoff (2010) suggested in their study that debt affects growth within a certain threshold. They contended that countries with debt over 90% of GDP would observe positive effects than the countries whose debt to GDP ratio falls below that threshold. This was challenged by other researchers such as Herndon et al. (2013) who argued that the positive effect fades away when it is adjusted for a coding error and a different set of data was employed. Checherita-Westphal and Rother (2012) also established that the consequence of public debt on growth is nonlinear, when they used twelve European countries as the sample size. Checherita-Westphal and Rother (2012) concluded that public debt is associated with lower growth rate of GDP and a debt to GDP ratio of about 90%-100%. However, another investigation by Baum et al. (2013) on the relationship between debt and economic growth, with twelve European countries as the case study from 1990 – 2010, revealed that the short-run consequence of debt on economic growth is positive.

On the other hand, Panizza and Presbitero (2012) suggested that there is no association between debt and growth, when debt was estimated using a variable that takes into account the linkages between foreign currency debt and exchange rate volatility. However, in a more recent study, Teles and Mussolini (2014) used endogenous growth model to test the relationship and concluded that debt has an impact on growth, and that impact is not only nonlinear, but it also depends on the magnitude of the debt. Lesser amount of debt results in increase in growth level while a greater debt amount leads results in the opposite because of the absence of decreasing marginal return for aggregate capital in endogenous growth models, causing a significant increase in governments' expenditure for servicing debts.

Although there has been numerous researches that have been undertaken on the relationship between public debt and economic growth, there hasn't being a solid conclusion on the effect of public debt on economic growth. Therefore, this research contributes to the ongoing discussion by testing certain variables, based on the theory of business cycles (discussed in chapter four).

1.4 FINANCIAL INSTABILITY AND GROWTH

The link between macroeconomic policies and the financial market is an important relationship to explore as it gives an understanding of the relationship between government activities and financial stability. One of the factors that can determine economic growth is the financial system. The institutional structure and efficiency of financial systems are vital determinants of economic growth (Prochniak and Wasiak, 2017).

Financial stability denotes the functional capability of financial institutions and sectors that constitutes the financial system. Financial instability on the other hand is a situation whereby the economic proficiency of financial institutions has been affected by volatilities of assets prices or the inability of financial intermediaries to carry out their contractual obligations (Crockett, 1997). Financial stability on a general note can be said to be a state at which financial markets are stable. In other words, it reflects low level of volatility in some economic and financial indicators such as bond spreads, price level, interest rate, money supply, private sector credit, exchange rate, stock prices, etc. (Das et al., 2010). It can also be seen as the nonexistence of financial crisis and the intrinsic capacity of the economy or financial market to prevent, insulate and tackle any imbalance that can threaten the system.

Financial stability is an important aspect of an economy, because the decisions policy makers take on a daily basis are centred on maintaining stability. It provides the framework or the system for allocating resources through time, therefore improving aggregate savings and investment. Without financial stability and public debt, economies are poor and will remain poor. But with the ability to borrow and save, consumption can exist even in the absence of current income. Similarly, with the ability to borrow, firms can invest even when their revenues are not sufficient to reinvest. However, when the debt ratio rises above a certain level, financial crisis is likely to occur and could be severe (Reinhart and Rogoff, 2009).

According to Chant (2003), financial stability is advanced by situations where investors experience really reduced levels of financial uncertainties. Occurrences in the 1970s and 1980s in developed countries indicated that high inflation levels resulted in greater unpredictability in inflation levels, consequently producing larger volatilities in the rates of interest and several economic conditions. Therefore, financial institutions and investors reacted by reducing the maturity dates of their financial obligations, including other regulations, so as to forestall unfavourable market conditions in the face of rising volatilities. The search for low and steady inflation rates can decrease the level of uncertainties for stakeholders of financial institutions. In the long run, the objectives of financial stability, as well as low and stable inflation rates seem to be compatible and jointly beneficial to the economy.

Financial instability, on the other hand, can hinder economic activities and affect economic well-being of a country. When financial markets cannot operate in normal and stable economic condition or portions of financial activities are strained, the consequent impact on businesses and households could have serious damages on the real economy as funds might be restricted or stopped from circulating into areas of worthwhile investments, and a recession may occur (Nelson and Perli, 2005).

Changes in asset prices and interest rate occur on a daily basis and so does the conditions of businesses and the financial market. However, these changes do not necessarily constitute financial instability. What constitutes financial instability is the degree by which these shocks or changes impact the capability of a country to produce goods and services. Therefore, the severity of the constant fluctuations of asset prices and interest rates can be used in the differentiation between usual fluctuations of financial markets and fluctuations that lead to instability. An intense and continued swings in asset values and interest rates have severe consequences because they impair the efficiency of financial systems by hampering their capacity to allocate funds competently from creditors to debtors. It also affects the ability of financial systems to handle risks successfully or to offer the payments for services. These activities are important for a strong economy (Chant, 2003). Furthermore, the danger of financial instability can result in defensive policy responses that can deter the effectiveness of the financial system and economic growth.

Bleger (2006) is also of the opinion that financial instability can also be caused by an increase in market volatilities. Volatility might be a reflection of a rise in risk taking and a better flow of information and could in reality be positively correlated to economic growth. This volatility usually arises when the stock price changes is a reflection of the frequent new information that is available to the market. Simply put, in an efficient financial market, the prices reflect new information, and the practice of prices incorporating new information causes volatility.

This situation can be viewed as improving economic growth because when prices incorporate new information and investors are aware of these changes, they can take healthier economic decisions. Conversely, volatility can turn out to be very high. This happens when the investors' response to new information largely affects price fluctuations. In an imperfect market where there is asymmetry information, a lot of financial market stakeholders would not be able to indemnify against these fluctuations at a reasonable price. A high rate of volatility and lack of indemnity can create colossal effects on the economy, thereby causing a crisis, which in turn causes economic growth to plummet.

Instability in financial markets also causes negative repercussions for public finances. It disrupts government activities because they need to respond to instabilities in order to sustain economic activities. The response can have either a direct fiscal cost or an indirect fiscal cost. The direct fiscal cost calls for fiscal policy action, where the government intervenes either through buying toxic assets, subsidies, or paying out creditors like the United States government did during the bail out in 2008 and 2009. This action can later result in a rise in public debt levels showing up as a rise in stock flow adjustments or increased deficit. It was reported by the European Central Bank that throughout years 2003-2007, the stock-flow adjustment of the euro area was an average of 0.3% of GDP but because of the global financial crisis and various forms of interventions by different countries, it had risen to 3.2% by 2008 (Tagkalakis, 2014). The indirect fiscal cost is a result of effects of instability to economic activities. They can be low income because of reduced profits and asset prices, increased government spending (financed by borrowing) in attempts to offset the effect of the crisis, along with interest and exchange rate reactions to the state of the financial market.

According to Chant (2003) financial instability is not an inflexible condition, as it can take different forms and has an impact on economic performance. It can either be in a crisis form or a shock form. A financial crisis is a severe form of financial instability because the burdens on financial markets are so intense that it can affect its performance for a longer period. It results in the misallocation and mismanagement of economic resources, causing a fall in economic growth (Lai, 2003). However, financial markets can be prone to pressure long before a crisis occurs. While financial instability affects economic growth directly, its impact on the long-run economic growth can be a cause for alarm. We can see this trend in the way by which the financial crisis that begun in the United States in 2008 metamorphosed after a while into a global crisis affecting several regions like the Eurozone in 2010 and which still remains felt in some developing countries today.

Financial shocks often raise financial stress levels in an economy. An unexpected fall in value of assets or stock prices can negatively impact the financial situations of households, governments, banks and other financial intermediaries. This situation tends to result in an increase in interest rates as investors search for better rewards because of their perceived higher risk (Chant, 2003). High interest rates stemming from financial pressure could impair the short-run success of firms and affect the household welfare and governments by raising their costs of debt. An important attribute of financial instability is lack of confidence by investors. It manifests in the economy by way of capital flight, affecting the liquidity of lenders and financial institutions, thus causing a fall in output. The capital inflow to the five countries involved in the Asian Crisis fell from $93billion dollars in 1996 to $12.1billion in 1997, representing 11% of GDP of those countries (Lai, 2003)

Chant (2003) also suggested that an instant impact of financial instability arises from the failure of financial markets' capacity to carry out their functions. This situation can result in bad loans or cause financial institutions to reduce access to credit for new borrowers. They can also limit credit to their current borrowers or give them credit at higher interest rates or require higher collateral to mirror their awareness of higher risks. Some of this impact will occur in the local financial market where the instability started. However, there might be a contagion effect where the impact spreads elsewhere, affecting the real economy and ability of the government to carry out its obligations. For instance, the impact of a collapse in foreign exchange payments may cause payment difficulties in a domestic payments system. Subsequently, any consequential decline of financial market conditions may perhaps hinder their ability to finance business activities continually. In extreme cases, financial instability can cause economic meltdowns where the financial systems all together collapse, halting economic activities and deterring economic growth.

Therefore, this research discussed the channels by which financial instability affects economic growth for the case of West Africa. This is because instability undermines a country's capacity to perform which depends on an effective countercyclical monetary and financial strategy. Investors in the financial market continuously re-examine the risks of volatilities in the financial sector as this could restrict lending activities, because investors are aware of the cost of borrowing (Das et al., 2010).

1.5 RESEARCH QUESTIONS

i. What is the nature of relationship between public debt, financial instability and economic growth in West African countries and what factors can be used to determine this relationship?

ii. Do monetary and fiscal policy instruments have the same impact in addressing financial instability in the West African countries?

1.6 RESEARCH AIM AND OBJECTIVES

The overall aim of this research is to evaluate the impact of public debt and financial instability on economic growth of West African countries.

In order to attain the aim of the study, I will begin with various literature reviews on

i. Various schools of thoughts on the relationship between debt, financial instability and economic growth;
ii. An in-depth discussion on how financial instability has affected public debt and economic growth around the world throughout the years; and
iii. Establish different channels on how debt affects economic growth.
iv. Establish sources of financial instability
v. Discuss in detail the impact of public debt and financial instability on economic growth of selected West African countries

I will also be carrying out some empirical reviews by

i. Testing econometric models on financial instability, public debt and economic growth;
ii. Analysing the results and making conclusions and recommendations.

1.7 METHODOLOGY

This research adopts a quantitative research method, using secondary data from the World Bank's World Development Indicators was used. The reason for choosing a quantitative research method compared to a qualitative method is because, the study is trying to determine the effect of public debt and financial instability on economic growth. Those three key concepts can be quantified, and data is readily available to reflect those concepts. Also, since the study of the effects of public debt and financial instability on economic growth is not a new concept, the variables chosen are a pre-specified concept using the theories of financial instabilities as our framework which can only be carried out using a quantitative approach.

1.8 RESEARCH STRUCTURE

The study has 8 chapters. Chapter one is the introductory chapter containing the background of the study, the research questions and objectives of the study, and the methodology. Chapter two is the literature review on public debt and economic growth. In this chapter various themes were discussed such as school of thoughts on economic growth and the channels by which public debt affects the economy. Chapter three discussed literature reviews on financial instability. Sources of financial instability were discussed, as well as major financial instabilities that have plagued the world. Chapter four focused on the political economy, impact of financial instability on selected West African countries and the policy response. Chapter five discussed the theoretical framework of the study – Business cycle theories, and the conceptual framework of the study. Chapter six is the methodology and research plan chapter where the research approach was discussed, the tests conducted, as well as the statement of hypothesis. Chapter seven focused on the interpretation of empirical analysis and chapter eight presents the summary of the thesis and policy recommendations.

1.9 CONCLUSION

This chapter gave a synopsis of the direction of the thesis. It provided the background of the study where the relevance of the topic was discussed. The discussions on the relationship between economic growth and public debts were highlighted, and the rationale for studying that phenomena was explained. Furthermore, financial instability and how it affects economic growth was also introduced. The chapter also stated the research questions and the steps taken to answer them in the aims and objectives. The methodology used in analysis was briefly touched upon and the structure of the thesis was discussed.

CHAPTER TWO

LITERATURE REVIEW ON PUBLIC DEBT AND ECONOMIC GROWTH

2.1 INTRODUCTION

This literature review chapter was created in order to establish a theoretical foundation of public debt. It examined and recognised the backgrounds of public debt and how it affects economic growth and financial instability. Furthermore, in conjunction with the research objectives, this chapter discussed various schools of economic thoughts on public debt such as classical and Keynesian schools of thoughts. The classical economic thoughts reviewed were from scholars such as David Hume, Adam Smith, David Ricardo, J.S. Mills and Thomas Malthus. While the Keynesian economic thoughts reviewed were from scholars such as J.M. Keynes and Franco Modigliani. Also discussed were the channels by which public debt impacts the economy.

2.2 REVIEW OF VARIOUS ECONOMIC THOUGHTS ON DEBT AND ECONOMIC GROWTH

There have been various literatures on public debt by different scholars over the years. Each scholar saw public debt in a different context. A broad definition of public debt is that it is the total amount owed by the government of a country either to its citizens or foreign creditors. In other words, it is the amount a government (either central or other tiers) borrows from sources outside itself to carry out various projects. It can also be seen as what government incurs when its spending is greater than its revenue. The sources government borrow from include individuals, firms or from other countries. However, different scholars specify what public debt they are discussing in their literatures. Some of the popular forms of debts discussed are:

- Internal Debt: This is the total amount of money borrowed from the citizens or residents by the government.
- External Debt: This refers to the total amount of debt owed to non-residents of a country. In other words, it is the unpaid amount consisting of principal and interest rate which a government owes to foreigners.
- Sovereign Debt or National Debt: This is the total amount of debt owed by the government to both residents and non-residents of a country.

It is important to note that when we talk about public debt in this study, we refer to the national or sovereign debt.

2.2.1 Classical Economic Thoughts on Public Debt

The classical school of economic thought refers to the works by scholars in the eighteenth and nineteenth centuries such as Adam Smith, David Ricardo, Thomas Malthus, John Stuart Mill among others. Their major assumption and primary principle is that the economy will always regulate itself towards equilibrium without government intervention. The classical school was also of the opinion that a high rate of debt is caused by excessive government spending on unprofitable activities, and can lead to crowding out of private savings, which reduces investment and output. This is because total savings is assumed to be consistent with total investment; therefore, as public debt hinders savings, it hinders investment as well.

As aforementioned, one of the main assumptions is that the economy is in full employment. Therefore, any form of public debt by the government means that they are diverting scarce resources from the private to public sector of the economy.

Another underlying assumption was that there was no significant difference between public debt (state or national debt) and private debts because both are for balancing the flow of income and expenses over a period of time. Early classical writings were influenced by huge public debt that Britain suffered in the late 17th century. This stemmed out of the parliament taking over the control of taxes for debt services, which at that time was a private credit to the monarch. This action made it easy for the government to borrow money and raise money because of public confidence in the government compared to lending money to a king.

An early classical economist who was not a supporter of public debt was David Hume. He was of the opinion that creating public debt results in bonds that act as a substitute for money, in as much as they are easily negotiable and without default risk, it raises the liquidness of trade. Hume was of the opinion that at some point, a continuous rise in public debt will gradually raise the present taxes and it will result in creation of further burdensome taxes. This ultimately will create default that can destroy bondholders in favour of normal populace. Those who decide on the default would desire for it to be advantageous to the bondholders instead of the general public. It will finally result in either the state destroying public debt or public debt extinguishing the state (Theocarakis, 2014).

Adam Smith, who is regarded as the father of classical economics was also not in favour of government intervention in allocation of resources. He opined that when a government borrow funds from private investors, they are denied the capital required for promoting manufacturing and trade. He frowned at the "wasteful" nature of governments. He suggested that government ought not to have budget deficits because it contributes to a rise in public debt and a decline in economic growth, even if the debt is owed locally.

This idea was formed on the belief that governments can easily borrow money and transfer burden to later generations. Also, the inconvenience of levying new tax can ultimately lead to currency devaluation (Theocarakis, 2014). Therefore, if government wants to repay the debt, they will increase taxes, which will have a harmful effect on local investment and cause an increase in capital flight, and consequently, exchange rate problems. The reason for this 'ripple effect' is because taxes reduce household spending and can sometimes reduce savings. Since the amount saved is in turn the amount available for investment, a reduction in savings would mean a reduction in the amount available for investment. Therefore, the amount of public debt owed by the government causes a decrease in investment by an equal amount, since savings equals investment under the classical school of thought.

Furthermore, Adam Smith is of the opinion that government should always have a balanced budget except in times of crisis; it is only in war situations that government can operate a budget deficit and accrue debt and should be financed either with tax or loans. The Institute of Economics and Peace (IEP) (2011) reports that both World War II and the Korean War were financed by loans and taxes respectively by the United States government. According to them, the public debt was over 120% of GDP during World War II and tax revenue rose more than three times to over 20% of GDP during the Korean War. The rise in tax revenue was an average of 5.8% between 1950 and 1953 with its peak at 1951 with an 11.4% increase.

The disadvantage of using taxes to fund budget deficit according to Smith is that a portion of taxes is made up of capital. This stems from the fact that the two main sources of national income (land and capital) according to Smith will be burdened by a high rate of tax so as to enable them to service the debt. Therefore, productive capital will be withheld from the investors who could have used it efficiently and transferred to the government. Since the main intention of the government is not productivity, economic activities such as trade, agriculture and hence manufacturing would decline (Holtfrerich, 2013). However, with loans, the lender is not burdened since he can loan his capital while holding liquid assets. Smith also believed that the easiness of government borrowing and the transference of burden to future generations joined with the inconvenience of levying new taxes can ultimately result in economic crisis and failure to service the debt. This could further lead to devaluation of currency or to bankruptcy.

David Ricardo was another classical scholar that got into the discussion of public debt. He agrees with Adam Smith on the notion that government spending on unproductive activities causes a rise in public debt and hinders economic growth. This is because of his opinion that national debt is dangerous because it causes disequilibrium in the price of goods and services. He believed that government borrowing is mostly used for unproductive activities, instead of the money been used in promoting production and employment. Furthermore, he opined that government should only borrow in cases of emergencies such as war and that war can be financed in three ways; either through taxes, loan with an annual interest rate or loan to be repaid at a specified time. Ricardo argues that the burden of public debt is derived from the reduction in the initial capital accumulation and the burden of debt is borne by the generation that incurred it (Wood, 1994).

However, his dislike for public debt was more obvious than Adam Smith. He advocated that wars should be financed completely by taxes and appealed for an overall repayment of public debt by a one-time taxation on the state's property (Holtfrerich, 2013). Ricardo was also of the opinion that government should limit public spending. According to him, in some situations, there is no difference in outcome when government spending is financed through debt or taxes. If the government opts for taxes for the purpose of funding expenditure, then the masses will constantly get loans for the corresponding amount taxed. He was convinced that although there is no distinction in principle, he did not encourage public debt because it causes people to be less prudent and prevents people from seeing the true situation.

David Ricardo identified three means for which a supposed expenditure of £20million for war purposes could be funded. Firstly, direct financing by taxes; secondly, borrowing without paying the principal on a yearly basis of one million in interest, (proposing a 5% interest rate); and thirdly, creating a fund where additional revenues are paid, and the amounts received compounded until it reaches the £20million that will repay the principal. He claimed there is a "public debt illusion", when individuals believe that it is not burdensome to pay tax to fulfil terms surrounding debts in perpetuity than to repay the full expenditure in a single payment. He is also of the belief that capitalists will move their monies overseas if they are to remain in a country that will maintain taxing them to repay the public debt interest. He therefore advised that it is better to pay in time of peace all the debt that was accumulated for war financing (Theocarakis, 2014).

John Stuart Mill on the other hand believed that a high public debt can be advantageous to a country in three forms. The first is, if a country uses excess foreign savings as the source of its financing; secondly, if government borrowing causes savings; and thirdly, if government borrowing controls local savings that would have been invested wastefully or invested in foreign countries (Tsoulfidis, 2011).

A rise in the interest rate is a way to ascertain if borrowing was gotten from foreign or unproductive capital. If the interest rate stays unchanged, it means that borrowing has no harmful effect (Theocarakis, 2014). Otherwise, public debt and private capital are in competition, interest rate rise, and workers pay the cost. In cases of unsettlement or crisis where the government needs to borrow, there might be a rise in interest rate at that point and this increase is an indication that the government is in competition with the private sector for finances that were to be invested in profitable ventures. But then again, the government with all its power is diverting these resources to its unprofitable activities.

Mill also agrees with Adam Smith and David Ricardo that public debt causes a negative effect on capital that could have been used for productive activities and that it is important to pay-off debt straightway by a general contribution or through regular payments from surplus revenue. According to him, when capital is removed or taken from production or from the fund intended for production and lent to the government, and spent wastefully, it means that the fund is denied to the labouring class. Thus, the loan is indeed repaid in the same year and the cost required for repaying it is really made, just to the wrong individuals. Furthermore, even if the government does all it can to fully repay the debt, it still bears the cost and the repayment of its interest in perpetuity.

Another classical scholar was Thomas Robert Malthus whose primary concern was on sufficient food production and the growing population. He agreed with the unproductive arguments of Adam Smith and David Ricardo because he felt that high public debt would lead to a high rate of taxation to service said debt, thereby affecting food production (Holtfrerich, 2013). He believes that unproductive workers such as soldiers and sailors contribute to full employment. He explains that even though they survive on taxes without them producing, they create the necessary consumption for the economy to attain full employment. He condemns public debt because he believed that it is dangerous for economic growth.

2.2.2 Criticism of the Classical Economic Thoughts on Public Debt

The basic ideology of the classicalists that a high public debt leads to decline in economic growth still holds in this era of the 21st century where the European debt crisis that started in late 2009 is an example. The crisis emanated as a result of the global financial crisis and the inability of countries in the Eurozone such as Greece, Spain, Portugal, Ireland and Cyprus to repay or refinance their government debt and the inability of the countries to bail out their over indebted financial institutions.

However, it is important to mention some of the flaws in their ideologies and works such as; at the time of the publications of Adam Smith, David Ricardo, J. S. Mills, David Hume and Malthus which was between the late eighteenth and early nineteenth century, there were no empirical methods of calculating the debt to growth ratio, as the debt/GDP ratio was a concept that emerged in the 20^{th} Century. Also, during that period, there were no intergovernmental organizations like the World Bank, International Monetary Fund (IMF) or the European Union (EU). International borrowings were between two countries agreeing to an interest rate and due date for the principal amount to be repaid. Therefore, it was necessary that the scope of government of the 21^{st} century be enlarged to include intergovernmental organizations[1] as problems or situations in member states become the responsibilities of group as a whole. For instance, the European Union acts a governing body over its member states and any economic situation that affects one of them, affects all.

Intergovernmental organizations, like any form of government under the classicalist school of thought, are likely to cause disruptions in economic activities. For instance, in Greece, after the financial crisis affected its budget, the national government received billions of Euros as bail out money in 2010 from the EU and International Monetary Fund and the prerequisite was that Greece implemented spending cuts and increased taxes, which later added to raising unemployment and falling standard of living. If Greece was not part of the European Union or were not using the Euro, it might have been able to improve its economy by printing more of its currency or devaluating its currency so that their exports could increase. Also, it could have been able to lower its interest rates, thereby boosting internal investment, so that debtors could service their debts easily. But since it was obligated to share monetary policy

[1] International organizations are organizations composed primarily of sovereign nations called member states coming together as a group under a treaty to carry out projects in common interest such as the European Union, World Bank, World Trade Organization, International Monetary Fund, etc.

with the other members of the EU, it was unable to do so and might continue to need bail out money from intergovernmental organizations in the future.

During the crisis period in 2008, the fiscal condition of Eurozone got worse, because the vast majority of euro zone members did not take advantage of reducing their government deficit and debt and did not create opportunities for automatic stabilizers to freely operate. Note that governments are the biggest lender in the domestic economy and financial system issuing bonds in domestic currency with a safe interest rate. This is in contrast to classical economic assumption that government borrowing leads to removal of money or funds from the productive private sector to the unproductive. In recent times, the government has helped bail private sectors from unproductive activities that has affected the economy. For instance, the U.S. government had to bail out some of the insurance giants such as the American International Group (AIG), while the U.K. government bailed out Northern Rock in the wake of the global financial crisis. Government must have a clear future-oriented program including budget plans for a few years into the future. The decisions should be clear and fiscal policy expansion and contraction should be monitored (Bikas and Zaltauskaite, 2014).

Additionally, "war" was the only acceptable scenario where public debt was encouraged by the classical economists. However, it is not the only form of crisis or the only reason why governments have borrowed in recent years. There are other reasons for government borrowing such as for investing in public sector development or capital expenditures, providing bail out for financial institutions, or because of a decrease in tax revenue. The recent global financial crisis of 2008 or the eurozone crisis from 2010 were not as a result of war but as a result of greed on the part of financial institutions in the United States of America, which was made possible by their monetary policy.

As stated earlier, the classical economists were not in support of the government intervention in the economy except in times of crisis. Therefore, in cases such as the global financial crisis, the solution provided by Adam Smith would have been that the government could borrow but that this should be financed by taxes; and Ricardo's would have been to borrow a huge sum at once which would technically increase debt. However, the International Monetary Fund (IMF) claimed that the global financial crisis of 2008 was worsened by taxation policies, which drove the credit boom before the downturn.

2.2.3 Keynesian Economic Thoughts on Public Debt

Unlike the classical economists' assumption that the economy is always at full employment level or self-adjusting towards full employment, the Keynesians argue that such economy may result in underemployment equilibrium. Underemployment equilibrium refers to a situation whereby there are resources that may be unemployed by the private sector for a length of time in the absence of corrective actions by government (Gupta, 2007). Therefore, Keynesians argue that government allocation of resources does not rob the private sector of anything but rather raise aggregate production and income by making use of those untouched resources.

John Maynard Keynes, commonly referred to as the father of Keynesian economics, proposed that during recession, government should prevent using taxes. He suggested that government should rather borrow (as a source of finance) and it should pay back debt in periods when the economy is in a better shape with a budget surplus. Then government needs to motivate activities in the economy by directly or indirectly purchasing goods and services.

The reason why this action is necessary is because expectations in periods of economic downturn are low or worse, and so, governments do not increase taxes as it sends bad signals to stakeholders. Instead, they use loans from the capital market or Central Bank to take care of its budget deficit. Budget surplus can be achieved either by cutting expenditures or raising its tax revenue. This rise in tax revenue could be achieved by raising tax rates or a notable increase of GDP at current tax rates (Becirovic et al., 2010). Keynes also opined that for a government to reduce its spending in the budget, there are automatic stabilizers that can adapt to the economic situation.

The alternative to increasing tax is reducing costs or spending. For every budget, there are automatic stabilizers that aid in the dampening of fluctuations in the real GDP such as personal taxes and welfares. For instance, if the economy is facing a depression, unemployment welfare increases, whereas they reduce during an economic upsurge. Sometimes, the government can face challenges when trying to intervene in the economy. These challenges could come in the form of costs of projects. A project may involve large capital and/or may need political backing before it can be undertaken. The period of time before it gets the backing may take a lot of time or the completion date could be long term. While steps to carry out this project are still ongoing, the economic situations can change rapidly, so the extra public demand for money and resources can create crowding out or inflation because the aggregate demand is higher than aggregated supply, but these expenses cannot be 'evaporated' until the project is completed.

In addition to the challenges that governments face with spending cuts, there is also an issue with cutting subsidies and cancelling projects for political reasons. Such reasons can stem from bargaining power of pressure groups such as labour unions, with the inability to cut expenditure resulting in growth of debts.

Keynes also opined that the magnitude of public debt does not matter and the size of the interest to be paid does not form any burden on society. According to him, an increase in public debt means that the government can access savings and make productive use of the funds raised with the aim of raising the national income or economic growth. In periods of unemployment, a rise in public debt adds to the capital formation, as it helps the development of sources of savings institutions such as banks, financial markets, etc.

An important contributor to the Keynesian school is Franco Modigliani. He believed that an increase in debt is beneficial to those present at the time of increase. This increase will place a burden on the future generation because of the decrease in the stock of private capital. Also, that the burden of public debt can be narrowed as long as the rise in debt is followed by a rise in public expenditure which adds to the real income of future generations.

Modigliani argued that irrespective of how a government finances its public debt, the amount of the current resources remains the same. However, the choice of financing may adjust the allocation of resources to private investors, therefore, consumption and investment will be largely affected.

In closing, Keynesians do not conclude if public debt has a negative or positive impact on economic growth because it depends on the economic state. Therefore, there is no general recommendation to policy makers. Thus, they need to identify the state of their economy and take appropriate measures (Tesic, et al., 2014).

2.2.4 Criticism of The Keynesian Economic Thought on Public Debt

Keynes contrary to classical economics emphasised government intervention and borrowing instead of levying taxes. As mentioned earlier, he argued that when an economy is in a recession, government should avoid the use of taxes but should rather borrow to fund its spending and then should back when the economy is in a better shape with a budget surplus. The main criticism of this suggestion is that high rate of borrowing can lead to crowding out of investment. This is because increased level of borrowing causes the cost of borrowing (interest rate) to increase and investors, and high rate of interest causes investors to look elsewhere for better deals, resulting in the crowding out of investment. Examples of high rates of borrowing, high interest rates and crowding out can be seen across major financial instabilities (discussed in section 3.5).

Keynes did not believe that government spending could negatively affect the confidence of private investors. According to him, government spending stimulates economic activities and can in the long run revert a budget deficit. But this is not always the case especially in a recession. For instance, the effect of government borrowing during a recession is exemplified in the case of Greece during the Euro debt crisis, where the government borrowed in order to meet its obligations, however the economy did not get better. They borrowed over two years and even sold government enterprises to the private sector as a way to raise funds (Anand et al. 2012).

Additionally, a major challenge facing government intervention is financing costs such as costs for repayment and interest. For long term projects, long term loans are taken. These costs cannot be expunged, except if the loans are repaid earlier than the maturity date. But because the long term investments are huge, it is hard to attain and it is not beneficial for the creditors to lower interest rate due to lower interest earnings. Furthermore, if in the short run government revenues reduce due to lower rate of economic growth, the government will collect fresh loans to finance old debts, consequently, the effect of compound interest raises debts.

Another criticism of the Keynesian economic thoughts on debt came from the Austrian School of economics. Keynes intervene in a recession by borrowing, however the Austrian economists argue that a recession period is part of the natural order of the business cycle and it is usually followed by a recovery period. Therefore, government interference during a recession only weakens and impairs recovery (Jahan, et. al. 2014).

2.3 CHANNELS THROUGH WHICH PUBLIC DEBT AFFECTS THE REAL ECONOMY

The effects of public debt on the real economy cannot be overemphasized. Whether it is a conscious effort by the government through policies or as a result of crisis, it has consequences for the economy. The risks or consequences of sovereign debt can be transmitted through two ways; the first channel is through the financial system and the second is directly upon the real economy.

The financial system is a vital and integral part of the economy. Most human daily activities revolve around the financial system. Some of the activities include savings, loans, mortgages, buying and selling of securities government securities, etc. This is a major reason why the effects of public debt or any form of shock to the economy affects the financial system. There are several channels by which risks of sovereign debt can affect the financial system.

The Committee on the Global Financial System (CGFS) identified four channels of transmission. The first one is through banks balance sheets. This is a result of banks holding enormous volumes of government debt securities on their balance sheet. Therefore, any form of loss on government debt has a straight adverse result on the assets on a bank's balance sheet and also on the liquidity of the bank. Secondly, government debt is sometimes used by banks as collateral for getting loans, which consequently raises public debt or sovereign risk lessens the accessibility or worthiness of the collateral, resulting in a further decrease in their financing ability. Thirdly, an increase in public debt causes lower ratings for domestic banks, raising costs of funding and possibly weakening their market accessibility. Fourthly, it decreases the benefits that banks get from implicit and explicit government securities (CGFS, 2011; Popov and Van Horen, 2013).

The effects of public debts can also be transmitted directly to the real economy through interest rate. As a result of high public debt, rising interest rate crowds out private debt and shrinks total investment, which deters economic growth. This also diminishes how much foreign investors are willing to invest in the local economy making it hard to finance the debt, thereby leading to the payment of interest overseas, which can be challenging for the country if it cannot effortlessly retain a current account surplus. Another channel is through public investment. According to Bruchez and Schlaffer, (2012), public debt has a positive outcome on economic growth if the funds raised to finance public investments such as infrastructure are beneficial to the economy. Subsequently, the high growth rate will make it easier to repay debts.

Furthermore, high levels of public debts may affect households and firms' ability to borrow, consume and invest. The level of public debt can cause weaknesses exposing households, firms and governments such as having creditworthiness problems. It can also make the economy prone to fluctuations in asset prices, intensifying shocks and financial instability. Borrowers using assets as collateral are restricted in their capacity to get loan if the real worth of the collateral drops, which can thereby prompt deleveraging. Similarly, high levels of public debt can cause weaknesses in the financial sector which can spread throughout a country (OECD, 2012).

2.4 **CONCLUSION**

This chapter, in line with the research objectives, discussed classical and Keynesian school of thought on public debt. A major assumption of the classical school of thought is that the economy is self-adjusting and hence is always in full equilibrium. They are also against government intervention in economic activities, arguing that government borrowing causes a transfer of funds from areas of economic productivity (private sector) to areas of economic unproductivity (such as spending on welfare and pensions). However, this is not the case in recent years, as governments have borrowed money to fund private sector activities and, in some cases, have bailed them out. Additionally, the classicalists argue that public debt create burdens for the next generation as future taxes need to be raised to repay the debt. These taxes would cause a reduction in savings, which limits productive capital to investors, and so, activities such as trade and manufacturing declines.

Conversely, J.S. Mills, a classical scholar is of the opinion that a high rate of debt can be beneficial to the economy, if the borrowing leads to savings. This is based on an assumption that government borrowing mean that actual resources remain the same and people would be able to save. The classicals suggested that government spending can only be funded either by taxation or by borrowing. Therefore, an increase in interest rate would mean that the public debt is harmful. Otherwise, public debt and private capital are in competition when the interest rate rises, while the workers bear the cost (in terms of taxation and reduced savings).

Similar to the classicals, Keynes also argue that government spending is funded either by taxation or borrowing. However, he did not support taxation as a source of finance during a recession, and instead recommends borrowing, suggesting the money should be paid back in periods of boom. Keynesians do not agree with the stance that the economy always adjusts itself towards equilibrium. They recommend that there should be automatic stabilisers such as personal taxes and welfares to check fluctuations in real GDP.

Another similarity to the classicals is that the cost of repaying loans can be a problem because the interest charged may not be fully paid or the loans may have a really long repayment date. Despite this, Keynes did not agree that interest rates can form a burden on society because an increase in public debt reflects that governments have access to savings and makes use of debt to increase investment and economic growth. In contrast, another Keynesian, Franco Modigliani argued that rise in debt can be a burden to future generations. However, he believed that the increased debt is beneficial to the present generation. Also, the debt burden can be narrowed as long as the debt is accompanied by increased public expenditure, which will add to the real income of future generation.

Also discussed were the transmission channels of public debt. The two channels mentioned were the financial system channel and the real economy channel. The financial system channel includes balance sheets of banks. An increase in debt level prompts a decline in domestic banks rating, and they are no longer able to carry out their function of giving loan to businesses and households. While the transition on the real economy is through interest rate and public investment, high interest rates crowds out private investment, which in turn, reduces aggregate investment and causes economic growth to decline.

CHAPTER THREE

LITERATURE REVIEW ON FINANCIAL INSTABILITY

3.1 INTRODUCTION

In this chapter, various theoretical and empirical literatures on financial stability were reviewed as part of the study objective. The macroeconomic objectives of a country include price stability and sustained high rate of economic growth, among others, and financial stability plays an important role in achieving them. Therefore, it was necessary to discuss the concepts and sources of financial stability, including how macroeconomic policies affect financial stability.

Additionally, some major financial instabilities were reviewed starting with the Great Depression of the 1930s, the Asian crisis of the 1970s, the global financial crisis and the European debt crisis since 2007; explaining how financial instability has affected economic activities with a focus on debt level and economic growth across several countries. Also discussed were the similarities and differences across the crises.

3.2 THE CONCEPT OF FINANCIAL INSTABILITY

The financial market is an essential aspect of the macroeconomic system. It plays the role of directing investment capital to firms or businesses that have production potentials. If the financial market fails in properly performing this role, the economy may not perform proficiently, and economic growth would be affected (Mishkin, 2000). However, there is no unanimous characterisation of financial stability as different scholars have described it in various ways.

Crockett (1997) defined financial stability as the nonexistence of financial instability. Therefore, financial instability is a situation where economic activities are possibly weakened by volatilities in the financial asset prices or financial intermediaries' inability to attain their contractual responsibilities. This definition focuses on public policy (i.e. the effect of financial instability on economic performance such as inflation rate, asset prices, and fragility of financial intermediaries).

Das et al. (2010) on the other hand view financial instability from the standpoint of financial markets. They implied that financial instability is a situation characterised by a high level of volatility in some economic and financial indicators such as bond spreads, price level, interest rate, money supply, private sector credit, exchange rate, stock prices, etc.

On the other hand, according to Schinasi (2005), financial stability goes beyond the simple nonexistence of crises. A financial system may be categorised as stable if it fulfils the following conditions - Firstly, if it is able to efficiently allocate resources (either geographically and through time), and it can also carry out other financial and economic activities (such as savings and investments, lending and giving loans, among others). Secondly, if the financial system effectively evaluates prices, assign and manage financial risk, and thirdly, if the financial system is proficient in maintaining its capability to carry out these vital functions even in the face of external shocks or an upsurge of financial imbalances. This definition considers financial instability from the standpoint of efficiency of the financial system.

This study will be looking at financial instability as a comprehensive phenomenon combining the standpoints of public policy, the financial market, and the efficiency of the financial system. Therefore, in this study, financial instability is seen as a condition where financial markets are unstable and does not have the potential to prevent or protect the economy from a financial crisis. This means that financial instability is when markets are unstable and there are no effective structures in place to prevent the economy from experiencing a financial crisis.

3.3 SOURCES OF FINANCIAL INSTABILITY

The preservation of financial stability is a key objective of financial policy makers as its absence can be severe for economic activities. Financial instability arises when fluctuations in the financial markets affects their ability to incorporate information flows to the point that financial markets cannot effectively allocate investment resources. Lack of funds causes households and businesses to cut spending, leading to a shrinkage of economic activities, which in some cases are severe (Mishkin, 1997).

Mishkin (1997, 2000) and Crockett (1997) identified sources of financial instability, some of which are weakness of financial institutions, asset price volatility, foreign exchange markets, etc. Each of these is discussed below.

i. Fragility in Financial Institutions: This fragility can be from financial intermediaries or non-bank financial intermediaries. Financial intermediaries are important in the financial sector because they help to contain the problems of asymmetric information[2]. When a financial market is faced with a high level of asymmetric information, stakeholders lose confidence in the market, giving rise to the problem of adverse selection and moral hazard.

Furthermore, in situations where there are serious problems of asymmetric information, the financial market fails, because both sellers and buyers are not willing to accept prices for which they are uncertain, especially about the worth of traded bonds. Therefore, financial intermediaries serve as agents that monitor the flow of information within the system and protect the less informed party from exploitation or poor investment choices. Examples of financial intermediaries are commercial banks, insurance companies, financial advisers, etc.

Commercial banks are good financial intermediaries, since they provide added value by way of superior information and availability of high-yielding liquid assets. They achieve a steady portfolio over time as drawings by depositors occur randomly, allowing them to hold a large reserve. This enables them to have sufficient liquidness to meet regular drawings and also invest their assets in lesser liquid but huger yielding assets. In as much as investors believe in bank's creditworthiness, the market remains in equilibrium.

Therefore, stakeholders (creditors and borrowers) have trust in banks' capability to meet its contractual commitments. However, if there is a situation whereby

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[2] Asymmetric information which can also be referred to as imperfect information is a situation whereby a party in a transaction has additional or better information compared to another.

there is a large withdrawal of deposits from banks, they would have no choice but to sell their assets and, in most cases, incur losses. This triggers loss of confidence in investors and possibly a crisis. What this suggests is that, a weakening in the financial institutions' intermediation abilities such as giving loans can result in a fall in aggregate investment and hence, a fall in economic growth.

Sometimes, financial intermediaries also make bad credit judgments, that is, they fail to analyse properly the risks involved in the investment or the actual return in investment. This is what Crockett (1997) refers to as Disaster Myopia, a situation when the creditor's valuation of the hypothetical distribution of economic outcomes (subjective possibilities) is different from what actually is (objective possibility). Disaster myopia also stems from a couple of other reasons besides improper evaluation by creditors such as a sudden policy change or the financial intermediaries deciding it is not worth allocating resources and time in to analysing the investment prospects.

On the other hand, failures or fragility of nonfinancial intermediaries also have strong effects on financial instability of an economy. This can either be directly through its effects on firms' customers or indirectly over a wider effect on the trust in the financial sector to effectively carry out its obligations. Nonfinancial intermediaries also carry out huge financial transactions such as securities and foreign exchange, and therefore possess the ability to affect viability of the payment system (Crockett, 1997).

The condition of nonfinancial organisations’ balance sheet is another significant aspect for determining the impact of asymmetric information obstructions in the financial market. When there is a serious widespread weakening of lenders’ balance sheet, it increases the problems of asymmetry information in financial markets, and can result in enabling financial instability (Mishkin, 2000). In order to address problems of asymmetry information, issuers of loan sometimes use collaterals. Collateral decreases the effects of information asymmetry since it decreases the creditors’ losses when there is a default. In other words, if a debtor fails to meet their loan obligations, the creditor can liquidate the collateral in order to recoup some of the losses resulting from the issuance of that loan. However, if general prices of assets drop, the collateral’ worth drops too, signalling a rise in information asymmetry (Mishkin, 2000).

Similarly, deterioration in the quality of assets of financial intermediaries for a long duration of time can cause investors to lose confidence. For instance, banks invest in activities to generate more profit during an economic boom. This tends to be very rewarding as they can give out loans. But when there is a recession, or an unfavourable economic condition that causes the value of their assets to weaken, they can no longer finance such activities like they did during the boom and this causes people to lose confidence in financial institutions (Crockett, 1997).

ii. Asset Price Volatility: Asset price volatility is another source of financial instability. Not only is it connected with difficulties for the financial market, but also, volatilities in assets prices can have a direct impact on the investment level of the private sector. This impact is the outcome of fluctuations in the private sectors' assets and changes in the rate of return on savings and investment, which upsets the overall confidence levels. Imperfect information also plays a role in asset price volatility especially in terms of valuations of financial firms' worth because individual asset holders do not know the flow of expected income, neither do they know the components that stimulate the degree to which the market would discount it. For instance, a stock market collapse can raise adverse selection and moral hazard issues in the financial sector because it results in a heavy reduction in a firm's market value.

Similarly, an increase in interest rate can promote financial instability through asset prices. A high interest rate raises household's and businesses' costs, while decreasing their income streams, worsening of their balance sheets (Mishkin, 2000). Asymmetric information can also occur with a rise in interest rate. It arises due to households and businesses with risky investment plans are prepared to pay high rates of interest because if the risky investment turns out well, they would benefit the most. Therefore, higher interest rates raise the chances that the creditor is undertaking a serious credit risk.

If creditors cannot differentiate between the debtors with a riskier investment plan, they should reduce the amount of loans they give. This action would result in a decline of loans given to high risk projects at high interest rates. Consequently, when the demand for loans surpasses its supply, high rates of interest does not bring the market to an equilibrium state, because additional increase in the rate of interest would deter issuance of loans. Therefore, there will be a further increase in demand for loans (Mishkin, 1997).

Furthermore, rise in the cost of borrowing also has a negative repercussion on banks' balance sheets. This is because a bank's traditional role involves issuing short term and long-term loans, hence, there usually is a maturity mismatch between assets with lengthier maturity dates and liabilities. Therefore, an increase in interest rate causes a decrease in the net worth of assets because high interest rates diminishes the value of assets with longer maturity more than it does the value of liabilities with shorter maturity. Thus, if the credit value of bank loans were to stay unchanged, increases in interest rates causes a decline in net worth of a bank's assets resulting in a fall in banks' ability to issue loans (Mishkin, 2000).

iii. Foreign Exchange Markets: Financial instability as a result of foreign exchange is primarily caused by a currency crisis. Currency crisis happens when investors lose confidence in the ability of authorities to sustain exchange rate and find ways to lower their vulnerability to that currency. It can also be as a consequence of Central Bank's decision to peg their exchange rate which may not be compatible with the internal economic policies. Even if the rate is sustained for duration of time by using foreign reserves or imposing restrictions, ultimately, investors will feel that a change in the exchange rate is inevitable. When this occurs, a crisis can follow at a fast rate. This spreads to the real economy through the lack of Central Banks and policy maker's ineffective policies to resist speculations or plans to reduce the devaluation that affected their countries mostly through market pressures. In any of those situations, national interest rates may increase, and that slows down the economic activities and creates depreciations in the values of financial intermediaries' asset portfolios.

The possible harm that a currency can impose is mostly dependent on the potency of a country's monetary policies. If a country has weak monetary policies, interest rates might be increased to a high rate so as to protect the exchangeability of their currency, but strong currencies stimulate imports and makes exports expensive, widening trade deficits. However, raising the interest rate might be disadvantageous, especially if the financial market assumes that interest rates cannot be sustained at that high rate. In a situation where a country had a string monetary policy, adjustments to exchange rates might be adequate to re-establish investors' confidence and allow interest rates to be reduced without panic in the financial market. Currency crisis cannot occur when exchange rate is flexible (Crockett, 1997).

iv. Equity Markets: Financial unsteadiness in equity markets has not caused considerable real economic damage over a large portion of the post war period (Crockett, 1997). Unlike most currency instabilities, equity market crashes are not straightforwardly described by logical speculative behaviour. Equity market stakeholders are always waging against themselves and not against the formally specified disequilibrium rate. As markets have a tendency to demand return against risk, an undesirable shock may large fluctuations in asset prices than a positive shock will. This is because increased volatility risk will intensify the undesirable shocks but will neutralise a positive one.

Stock market failures have the possibility to disturb real economic activities in a number of ways. Firstly, a reduction in private sector wealth will have direct consequences on readiness to consume present income. The magnitude of this consequence is perhaps not big enough because wealth held as equity characterizes only about 25% of total household wealth. Furthermore, the majority of equity is possessed by financial intermediaries such as insurance companies and pension funds whose eventual recipients are not necessarily sensitive to short-term volatility in asset prices.

The second way through which stock market failures affect real economic activity is the impact of equity valuation on the attraction of purchasing physical assets. If the market estimation of the potential flow of returns created by a sector's asset drops, then the desirability of procuring physical assets also falls, thus possibly decreasing investment expenditure. The third consequence of stock market failure is on the role of financial intermediaries. If falling equity prices decrease the wealth of financial institutions and their clients, the drop can worsen complications of asymmetric information and result in a decline in the amount of financial intermediation. This would then cause it to be tougher to organize funds for industrious investment and would cause a growing reduction in output levels. The fourth way by which stock market failures affect the real economy is through the influence of financial market growths on confidence levels. Since the time of Keynes, financial analysts have accepted the function of confidence in defining the volume of business investment (Crockett, 1997). If there is a rise in future uncertainties, investors may react by lessening their openness to such uncertainties, thereby lessening how much they are willing to investment.

v. Fixed-Interest and Real-Asset markets: The causes of instability in the fixed-interest and real-asset markets are like that of the equity markets, however, the interest rate medium is apparently tougher. Variations in the macroeconomic events makes investors re-examine their predictions for inflation and real interest rates. Therefore, they incorporate the surprising changes to the price of fixed-interest bonds. As the bulk of investments backed by bonds or loans with longer maturity dates usually exceeds those financed through equity, movements in bond yields have a more prevalent effect on the total investment.

Real estate values are also essential for economic activities. The reason being that a sizeable amount of real estate holdings is funded through borrowing, and also, real estate is sometimes used as indemnity for numerous financial businesses. Therefore, rise and falls in prices and values of real estate can intensify the effects of fluctuations in interest rates on macroeconomic activities. A rise in interest rate causes a fall in real estate value as it can lead to debt-servicing problems for borrowers. A weakness of real estate prices, in turn, results in decreasing the indemnity values for lenders.

3.4 MACROECONOMIC POLICY AND FINANCIAL INSTABILITY

Macroeconomic policies are rules, regulations or actions taken to control shocks or activities that can destabilise the economy. However, there are some classical economists who feel that there should be no intervention or little government interference in the economy[3]. According to them, a government should only interfere in times of national crisis such as a war. They are of the opinion that the market will always tend towards equilibrium and that government are likely to make wrong decisions as they could be influenced by political pressure groups.

On the other hand, other economists like J. M Keynes and Modigliani[4] argue that there should be some form of intervention. They suggest that government or Central Banks should intervene for the purpose of income redistribution and to control prolonged recession. During a recession, there is a severe decrease in private sector investment and spending, causing a decline in economic growth. They also suggest that governments can borrow money from the private sector and use the money to address market inefficiencies such as employment of untouched resources. Furthermore, if there is a reduction in money supply, Central Banks can procure public sector bonds or print money. Keynesians are of the opinion that governments can intervene in the economy through fiscal policy while the monetarists argue that monetary policy should be the tool for intervention.

Fiscal policy has an important role in the economy of "shock absorber" as it is a primary instrument used by governments to sustain financial stability. This is because governments have a significant role in controlling the national budget and their decisions on revenue and expenditure has a huge effect on aggregate output. Therefore, in times of instability, fiscal decisions have to be made to ensure the economy is not largely affected.

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[3] See section (2.2.1)
[4] See section (2.2.2)

Governments use fiscal policy as a tool of economic sustenance according to Keynesian economics for two reasons; for expansionary purposes or for Contractionary purposes. Expansionary fiscal policy is a situation where the government aims at increasing the money in the economy, by creating employment and also increasing aggregate demand or output. It does this by reducing taxes, increasing spending on capital or developmental projects such as constructions of new roads, or building of more houses causing an increase in aggregate demand. This is usually employed in times of crisis. For example, at the height of the 2007 financial crisis impact, there was an increase in the U.S. government expenditure for the acquisition of lots of non-performing financial assets from the balance sheets of failing banks by the Bush administration. The Federal Reserve was allocated a budget of $700billion by congress for “bailing out” financial institutions by buying asset-backed securities, and other securities under the first Troubled Asset Relief Program (TARP).

Similarly, under the Obama administration, there was a second part to the expansionary fiscal policy in form of the American Recovery and Reinvestment Act (ARRA) in February 2009, where he allocated another $787 billion. It comprised of $288 billion in tax cuts and welfares; $275 billion in bonds, grants and loans; and $224billion in entitlements including an unemployment program (Tcherneva, 2011). Therefore, a government responds by using expansionary fiscal policy because it is effective in crisis time.

Contractionary fiscal policy is effective when a government is trying to reduce money in circulation. It does this by increasing taxes while reducing the money it spends.

Contractionary fiscal policy is usually used to curb inflation as demand for labour decreases and people have less money to purchase goods and services which causes inflation to reduce. Therefore, financial stability depends on the effectiveness of each discrete policy tool separately.

Hannoun (2010) expands those fiscal functions further and categorises them into three functions. Firstly, fiscal policy is used for the regulation of public demand by the use of taxes, automatic stabilizers and counter-cyclical policies[5]; secondly, for the creation of fiscal buffers in good times by reducing indebtedness; and thirdly, to help the financial sector in economic downturn through deposit and loan guarantees, banks lifesaving packages, and discrete fiscal inducements. For example, government decisions related to budget revenue and expenses have the biggest impact on public demand. One of the ways to increase public demand is temporary budget deficit increase by increasing public expenditures.

Investigating the theoretical relationship between fiscal policy and financial instability cannot be complete without paying attention to the effects of budget deficit (Jesic, 2013). One of the functions of a budget deficit is to stabilise the economy. According to Keynesian principles, during a crisis, the budget deficit would offer an incentive for an economy to promptly leave the downturn period. According to Hannoun (2010), developed countries used fiscal policy in the face of the global financial crisis of 2008 because of their zero-interest rate, which was therefore preferable to monetary policy. This was because fiscal policy plays a vital role in absorbing shocks and can play a

[5] Counter- cyclical policies are policies used to control the downsides of business cycle. This means increased government spending and reducing taxes in times of recession and less government spending and more taxes in times of economic boom.

role in preventing financial instability. It is important to use fiscal policies that have an almost instantaneous response to economic changes because monetary policy ought to be used for controlling inflationary processes while fiscal policy should control non-cyclical demand and maintain fiscal buffers withstanding the tension in finance system (Bikas and Zaltauskaite, 2014).

Monetary policy makes it possible for financial environments to be efficient and stable and can also add to the accrual of volatilities resulting in raising risks of financial instability. Shocks can prompt financial instabilities and weaken the efficiency of the monetary policy transmission channels. As financial markets incorporate new information, a sharp price movement can arise, leading to massive and significant losses, which reduces investors willingness to carry out projects. Since financial market activities, economic activities and monetary policy are interdependent, policy makers have paid considerable attention to monitoring activities of the financial market (Nelson and Perli, 2005). These risks can create a negative multiplier effect from asset sales down to the aggregate output of the economy.

3.5 SOME MAJOR FINANCIAL INSTABILITIES

The global economy has witnessed several financial instabilities most notably the great depression, the global financial crisis and the Euro area crisis. These crises destabilised economics with respect to debt and economic growth. Each crisis was responded to using different economic policies. For instance, monetary policies were employed to stabilise many economies during the financial crisis. In some countries, traditional fiscal policies were abandoned, and countercyclical fiscal policies were utilised especially by the European Central Bank. Therefore, this chapter helps to understand the various natures of financial instabilities.

3.5.1 The Great Depression

The great depression started in the summertime of 1929 in the United States. It began as a result of the decrease in aggregate demand and a massive decline in production, causing real gross domestic product and prices to decline rapidly. The fall in aggregate demand was a consequence of tighter monetary policy meant to regulate stock market speculation. This tightened monetary policy was in response to mild recessions between 1924 and 1927 where economic growth dropped to 5.9% in 1926 (Granados and Roux, 2009).

Before the mild recession, the US economy underwent a boom phase from 1921 to 1924 with stable prices of goods and services, with GDP increasing at an annual rate of 12.5% as at 1923. After monetary policy tightening in 1927, there was perceived economic recovery causing speculations to once again rise because of the confidence in the economy. Coupled with the rise of new technologies such as the automobile, electricity as well as real estate boom, there were positive speculations in the stock market which made the stock prices rise tremendously. Between 1925 and 1929, real GNP rose by 13%, manufacturing by 21% and unemployment was stationary at 3%. By the last quarter of 1929, stock prices had gotten to unreasonable numbers with respect to expectations in future earnings with the Dow Jones industrial index recording an increase of 215% between January 1925 and September 1929 (Allais, 1999).

The Federal Reserve slowly raised the interest rates because they did not want to destabilise businesses with a sudden rise, while decelerating the continuous increase in stock prices. The new interest rates reduced the sensitivities of some sectors such as real estate and automobile, spiralling reductions in construction and manufacturing. Thus, as stock prices began to decline in October 1929, there was a loss of confidence in the market and it crashed, with investors selling out in panic. Consequently, the fall in price made investors to clear up their assets, further driving down prices (Crafts and Fearon, 2010).

3.5.1.1 **Effects of the Depression on US Economy**

The initial effect of the fall in prices and the lack of confidence by investors caused the market to crash, resulting in about a 20% contraction in money supply between 1929 and 1932, and a 30% contraction in bank deposits. Investors who had bought stocks with borrowed short-term funds were forced to borrow again at very high interest rates, or to sell at any price in order to meet their obligations (Allais, 1999).

There was also a bank panic across the country where many people lost confidence in bank solvency and withdrew their deposits in cash within the same period. This caused banks to liquidate their loans with the aim of raising the required cash. This set of action of hasty liquidation made banks fail and resulting in a further contraction in money supply. The lack of confidence and fall in money supply led to a drop in the nominal GNP by 44%, real GNP by 29%, industrial production by 40%, and the general price index by 21% between 1929 and 1933. The unemployment rate on the other hand rose from 3.2% in 1929 to 25% in 1933.

The crash of the stock market caused a reduction in aggregate demand as firms' investment and households' acquisitions of durable goods fell. As a result of this fall, real GDP of the United States declined speedily in late 1929 and throughout 1930 as the GDP was -9% (Granados and Roux, 2009). The aggregate demand fell even more as a result of prevalent banking panic that hit the United States between 1930 and 1932. People lost confidence in bank solvency and demanded that their deposits were repaid in cash. As a result of this, between 1929 and 1933, business investment fell about 80%, employment fell about 25% and output fell more than 38%. Consumer durables which represent household investment declined by more than 55% and consumption of non-durables and services declined almost 29% in the same period (Cole and Ohanian, 1999).

The effect of the decline in aggregate output in America spread to other parts of the world predominantly through the gold standard. At that time, the gold standard connected countries by way of fixed currency exchange rates. With the gold standard, countries fixed a value of its currency in relation to gold and made monetary policy decisions to protect the fixed price. This made it imperative that they had to maintain a balanced budget and export more than they imported thereby getting income from abroad.

European countries had left the gold standard when the First World War broke so that they could print money to finance the war. Meanwhile, the American economy was buoyant because of their stock market bubble and technological innovations such as electricity, the radio, the automobile, and so on, during the same period. Their exports and foreign direct investment to Europe increased, causing their gold reserves to rise.

After the war, returning to the gold standard was not easy for the European countries because they had to lower their price levels, thereby causing governments to reduce their expenditures and reduce prices of goods and services. For instance, the British pound sterling was overvalued at 14% when they returned to the gold standard in 1925. As a result, Britain's export industries were no longer competitive, and unemployment rose (Crafts and Fearon, 2010).

Post 1918, America overtook Britain as the top international lender of the world. A lot of the war debts accumulated by France, Germany, and Britain were borrowed from the US government and US private citizens. The total war debt by European nations represented 11% of American gross national product in 1929 and private debts from Germany accounted for 13.5% of the US GNP (Allais, 1999). A consistent flow of dollars was essential for debtor countries, because it enabled their governments to carry out their obligations. The United States of America was accountable for 60% of global lending, and Germany owed about 33% of that. (Crafts and Fearon, 2010). With high rate of exports and investments abroad, the United States of America was able to support the ability of owing nations to purchase goods and services and to also service their debts.

Once this cashflow dwindled, the owing nations had no other option but to face balance of payment and debt settlement issues that they did not anticipate. Primary producers needed to act rapidly to lessen imports and increase while the terms of trade were not in their favour. In an attempt to address the gold and foreign exchange losses, the US used contractionary fiscal and monetary policies to seriously deflate their economies. Public expenditure was cut, wages were lowered, and there was significant rise in unemployment. It was difficult to generate earnings from foreign exchange, or to borrow from abroad. The United States stopped lending in 1931 and did get back the money owed to until the end of the decade. (Crafts and Fearon, 2010).

As the world economy fell into depression in 1931, international trade from Britain declined, which had a damaging effect on the trade in the U.S., and as a result the current account of the balance of payments went into deficit during 1931. During this period, import prices fell by 25% and both consumer prices and the price of final output fell by 10 (Crafts and Fearon, 2010).

3.5.1.2 **Recovery from the Depression**

Since reduction in money circulation and collapse of the gold standard started the great depression, it is not startling that currency depreciations and increase in money supply became the key recovery factors around the world. There is a prominent connection between the period when nations dropped the gold standard and depreciated their currencies, and the transformation in their economic growth. For instance, the United Kingdom abandoned the gold standard in September of 1931 and their economic conditions improved earlier than the United States whose currency were not depreciated until 1933, and so they much later.

Improvements in economic conditions in the United States of America started in the spring of 1933.The real gross domestic product averaged the rate of 9% per year between 1933 and 1937. However, between 1937 and 1938 the US had one more mild set back which hampered the growth rate. But the economy recovered in towards the end of 1938 and the American economy expanded at a significant rate, higher than it did before the mild set back. The United States output eventually had a long period of economic boom even up until 1942.

On the other hand, improvements in other parts of the world differed. The United Kingdom's economy stopped retrogressing as soon as they abandoned the gold standard in September 1931, and eventually the economic recovery because towards the end of 1932. The economies of some Latin American countries like Brazil and Argentina started their economic recovery towards the enc of 1931 and start of 1932. Germany and Japan also started their recovery periods towards the end of 1932, while Canada and some European countries began their recovery in the same period as the US in 1933.

3.5.2 **The Asian Crisis of 1997-1999**

The East Asian Financial crisis is a significant occurrence that happened in mid-1997 and remained up until late 1998. King (2001) suggested that the crisis occurred in two phases. The initial phase was a panic that arose in July of 1997 and continued until late summer, distressing the 'East Asian Tigers' – Thailand, Malaysia, the Philippines and Singapore. The next phase commenced in late October 1997 and it had a massive presence in Indonesia, Taiwan, Hong Kong, and it extended to Japan and South Korea in the end of December 1997. This second phase had the wildest outcome, triggering stock market to collapse in the US and Europe, while also and affecting emerging economies like as Brazil and Russia.

Prior to the crisis, several countries in the region such as China, Indonesia, Malaysia, Hong Kong, Japan, Taiwan, South Korea, Singapore, the Philippines and Thailand observed a significant currency appreciation in the early part of the 1990s. The region also enjoyed massive inflow of FDI which resulted in a long period of economic boom. However, by 1997, they had a huge current account deficit. The deficits were mitigated with the use of short term loans from abroad. (Diao et al., 2000). The region had a sustained growth rate with Indonesia having an average annual growth rate of 6.9%, Thailand 8.17% and Korea with 8.4% since 1970. The sustained growth rate and periods of economic stability caused foreign investment banks, foreign investors, and governments to be unconcerned, hence the shock when the crisis happened (Berg, 1999).

The liberalisation of the local financial sector was not followed by necessary supervision and regulations. Additionally, the private financial establishments caused numerous issues for the government such as the absence of competition in financial sector, improper supervision of the financial sector and considerable government involvement in economic activities (Berg, 1999).

A lot of the East Asian nations had a fixed-exchange rate regime, fixing their currency to the U.S. dollar and ran current account deficits, resulting in reduction in domestic interest rate. Meanwhile, commercial banks and big nonfinancial corporations in these nations were borrowing huge sums of money, mostly in dollars, from banks from abroad, while local banks issued loans to local investors in their national currencies. Also, a couple of big corporations from those countries also sought loans from abroad mostly in dollars but a large portion of their income was made domestically and in their national currencies. Therefore, as a result of currency mismatches, banks' balance revealed that liabilities were predominantly in dollars while assets were predominantly in local currencies. This led to significant decline in the worth of assets compared to their liabilities (Hale, 2011).

Berg (1999) opined that the current account deficits got to a point where is was no longer sustainable the exchange rate was overvalued. The East Asian Tigers did not get the expected benefits associated with huge FDI inflow (such as 3% of GDP in Korea, and 10% in Malaysia) due to tightened fiscal and monetary policies aimed at reducing the monetary effects of the FDI inflows and also to prevent currency appreciation against the dollars (because the exchange rate was pegged to the dollars).

In the wake of the crisis, several nations such as Korea, Indonesia, Thailand, and the Philippines amassed large amounts of short-term foreign debt. It rose from 11.4% of GDP to 15.9% of GDP for Indonesia, from 8.4% to 11.1% for Korea, 11.1% to 15.1% in Malaysia, 9.3% to 14.1% in the Philippines and 18.1% to 18.8% in Thailand between 1993 and the end of 1997.

However, once local banks' access to foreign credit ceased, a large wave of capital flights occurred. Most of the loans had short maturity dates, therefore banks could no longer service them or repay them like they used to prior to the crisis. Therefore, a banking crisis ensued across the East Asian countries and the percentage of nonperforming loans rose rapidly. Prior to the crisis, countries in the region had balanced budgets and almost-balanced budgets. But when the crisis occurred, governments had to look for a way to support banks and forced them to get help from the International Monetary Fund (Hale, 2011).

The event that triggered the first stage of the Asian financial crisis was an announcement that the Thai Baht would be allowed to float. Thus, the government abandoned their exchange peg with the US dollar because of pressure from investors, thereby effectively devaluating the Baht by about 20% (Chowdhury and Goyal, 2000). The Baht was under pressure towards the end of 1996 when the Thai stock market crashed, creating doubts in the stock market and also affecting the prices of real estate. By the end of the first quarter 1997, speculation about the Baht arose again because the Thai government decided to help some troubled Thai finance companies that were affected with the real estate issues. In May 1997, the Thai government enforced capital control measures that made the then finance minister to step down from his position because he could not successfully arrange a merger to rescue the biggest financial organisation at the time - Finance One.

The newly appointed finance minister (in that era) upon visiting the Thai Central Bank learnt that nearly all of the nation's $30billion foreign exchange reserves were bound in forward contracts, and an additional $8billion had been used by the Central Bank's to support distressed financial organisation. That newly appointed finance minister decided to back out on government's plan to revamp Finance One with public fund, allowing it to fail. This deed viewed as a break in trust on the part of government by the foreign investment banks, local bankers and foreign investors, on investments being secure. Therefore, there was massive capital flight, causing the Thai government to depreciate their currency and seek help from the IMF (King 2001).

The depreciation of the Baht and the break in the Thai government's commitment to Finance One caused foreign investors to re-evaluate the risks of investing the region. Within seven days, there was a widespread contagion effect. The Philippines floated their Peso on 11th July, Malaysia also let their Ringgit float on 14th July, compelling next-door Singapore to also devalue their currency. Indonesia on the other hand took necessary precaution enlarged their trading band on the Rupiah and was later floated on 14th August. Hong Kong raised their interest rates on 15th August, which caused their stock market to crash, while South Korea also increased interest rates and depreciated the Won but observed that the credit ratings of their major banks sunk as well (King 2001). The currency devaluation also caused foreign portfolio capital to leave these nations. During the first period of 1997, the total amount of capital flight was about \$12billion, while the overall amount in the second period was about \$109billion dollars. The aggregate of the capital flights accounted for 10% of the collective GDP of these nations. Therefore, the Central Banks were unable to sustain the fixed-exchange rate regime and had to depreciate their currency (Grozdev, 2010).

This inaction by the Central Banks resulted in foreign investors simultaneously withdrawing loans that were given in dollars from Thai companies. For instance, when Thailand abandoned the exchange rate regime, the Baht fell by 16% on that day and lost close to half of its value by the start of 1998 (Hale, 2011). In subsequent months, the region experienced a serious economic crisis. Although Hong Kong as well as China managed to sustain their currency pegs a little longer, they also experienced a crisis at later periods. The gross domestic product fell during 1998 by 13.7% in Indonesia, 9.4% in Thailand, 6.7% in Malaysia and 5.8% in Korea (Berg, 1999).

Investors and policy makers did not pay attention to early signals that the lending boom was no longer sustainable because the debt-to-equity for corporations were increasing. In 1996, the ratio was 301% for Indonesia and 517% for Korea respectively. Another early signal was the high rate of short-term debts to Central Banks reserves, which is a key estimation of the country's total foreign liquidity. In 1996, the ratio was 177% for Indonesia and 193% for Korea (Hale, 2011). As warnings of the Asian crisis became evident, policy makers attempted to stabilise interest rates, fiscal policies were mostly neutral (apart from Thailand who tried an expansionary policy. For instance, the initial response from the Thailand and Korean governments to the huge capital flight in 1997 was to interfere in financial regulation and also interfere in the foreign exchange markets so as to defend their currencies (Berg 2011).

As those countries allowed their currencies to float, they were confronted with the problem of deciding the policies that can be used to respond to the large capital outflows. Their aim was to restore equilibrium levels and confidence of investors so as to control the declining economic growth and avoid defaulting on foreign debts. Apart from Malaysia, the other countries continued to float their exchange rates, and this was done to access foreign investment, get funds to restructure the economy and also to adjust macroeconomic policies accordingly (Berg, 2011). The most severely affected crisis countries, Thailand, Korea and Indonesia further observed foreign liquidity crisis because foreign investors did not have confidence in their economies as their foreign reserves were not able to service their debts with short-term maturity. The adequacy of reserves of the course depends on capital flows themselves, but for these three, a "bad equilibrium" was possible in which investors, believing other investors would flee, would conclude that there were not enough reserves. Notably, the ratio of reserves to short-term external debt was substantially above one for each these countries.

In essence, the East Asian was a result of two main factors: currency mismatch and FDI inflows from abroad. Due to currency mismatches, liabilities had more values than assets, causing assets to be illiquid, therefore banks could no longer issue as much loans. In addition to the steady FDI inflows, acquisition of credit from abroad by big corporations was easy because of government banking. Consequently, banks ran out of low risk projects and financed high risk projects (so as to increase their revenue). However, the economic activities had a set because the borrowed dollars were invested in projects that did not yield foreign exchange, as most revenue were in their local currency. A large percentage of this credit had short term maturity dates but were used to fund medium and sometimes long-term projects. Most of foreign debt incurred by local banks had short term maturity. For instance, 56% in Malaysia, 59% in Indonesia, 66% in Thailand, and 68% in Korea. Therefore, risks associated with foreign exchange largely increased, and the inability to maintain the currency pegs to the dollar also increased (Sundaram, 2008).

3.5.2.1 **Policy response to the Asian Crisis**

The initial fiscal policy response to the crisis was to enact some contractionary measures. In Thailand, this was justified in part by the need to reduce the excessive current account deficit, driven in part by fiscal expansion in 1996 and 1997, in a context in which growth was expected to be slower than previous years but still strongly positive. A further argument in favour of fiscal restraint was related to the potential effect of fiscal policy on confidence that is on expectations regarding future policy. All of the impacted countries, with the exception of the Philippines, had a reputation for strong fiscal discipline. Nonetheless, as the magnitude of the problems were revealed, particularly in the financial sector, and as policymakers faced unprecedented economic and, in some cases, political pressures, doubts emerged as to the sustainability of the policy regime. While initial debt stocks were low, they were clearly growing rapidly and there was a case that demonstrating fiscal resolve might signal that the problem would not be allowed to grow out of control. The fiscal costs of the banking system restructuring are estimated to be enormous in most of the countries, ranging from 17% of GDP in Indonesia to 32% in Korea but only 3% in the Philippines according to World Bank estimates (Berg, 1999).

The availability of authorised emergency liquidity funding was created to mitigate the severe problems caused by the fast capital flights that was a key feature of this crisis. A total of 17billion dollars of support was committed to Thailand, $42billion to Indonesia, and $58billion to Korea. The packages were not sufficient enough to cover all the likely servicing of those short-term debt with less maturity dates, including stocks of short-term debt and scheduled amortizations of medium and long term debt. They instead relied on the assumption of some roll-over of maturing foreign debt, as well as some adjustments to the current account in order to reduce the financing gap caused by the capital flight. These Asian countries consequently found it difficult to convince some of the foreign investors to stay (Berg, 2011).

3.5.3 **Global Financial Crisis 2007-2008**

The global financial crisis began in the United States in 2007 and spread through financial markets of developed economies such as Spain, United Kingdom, Ireland, Greece, etc. It took a while before the crisis spread into developing and emerging markets such as sub-Saharan African countries and the 'BRICS', which were affected when the crisis grew into a global economic recession primarily through international trade (Dullien et al., 2010).

There are two arguable causes of the crisis according to Chomsisengphet and Pennington-Cross (2006). The first cause is the greed of bankers as they were concerned only about their bonuses and not the credit worthiness of potential homebuyers. They were able to circumvent the buyers' credit because of the convenience of subprime lending. During the recovery period from the East Asian crisis, some financial organisations that were under pressure saw the subprime market as a viable option to increase profits (Munro et al., 2005). With subprime lending, they were able to give mortgages to people who would have been denied in the standard or prime mortgage markets, therefore, giving easy access to loans in the subprime market. However, subprime mortgages comprised of higher interest rates, higher risks and poor collateral. The borrower cost of subprime lending depends on credit history and down payment requirements, while the prime market borrower cost is driven by the down payment alone as long as the minimum credit history requirement is satisfied.

The subprime lending was backed by investment banks such as AIG and Lehman Brothers in the form of Mortgaged Backed Securities (MBS). The MBS market was larger than the Treasury market and the nonfinancial corporate bond markets. Mortgages backed by MBS were prepaid without consequences. In late 2004, the overall value of mortgages in the United States was over $12Trillion, with $8Trillion made up of single-family residential for purposes and $4.5Trillion represented MBS (Nelson and Perli, 2005). Therefore, the more the housing prices were raised, the more subprime mortgages they were able to sell and the more the banks made more money.

These assets were oftentimes broken down further into several other financial instruments (such as Collateralised Debt Obligations) and sold to newer sets of investors, and in a few cases, this process had been repeated more than once. When the bubble burst, investment banks failed as well and needed to be bailed out. The refusal to bail out some banks like Lehman Brothers, initiated the crumbling financial institutions (Dullien et al., 2010).

These securities were inherently high in risk as people could not found much information about the assets, therefore any violation of them were not that easy to notice. In April 2008, the international Monetary Fund (IMF) valued the global losses at $945billion whereas the actual losses written down as at 2009 was below $200billion. There were worries that this possibly affected the creditworthiness of numerous financial institutions across the globe. Commercial banks were expected bear a huge percentage of the losses, while the other financial institutions such as the money market, hedge funds and insurance companies bear the remaining percentage of losses. However, not only were financial corporations of countries exposed, other sectors also felt the impact. For instance, in Norway, it was claimed that some local government sectors were exposed through investments in USA (Kellaway, 2009).

Consequently, the crisis affected the activities of the money market as short-term loans ceased, largely due to asymmetric information regarding the real worth of the borrower. This put financial institutions in a difficult situation, especially those that rely on issuing short-term loans. Even though a lot of steps were taken by the Federal Reserve to reduce interest rate and increase the amount of money in circulation, the financial sector did not get back to their pre-crisis state. The markets that dealt in MBS shut down because their assets could not be liquified into cash at banks. Also, the illiquid assets could not be traded or presented as collateral for borrowing purposes. Therefore, the main problems that the crisis caused for financial institutions were two-fold – inability to use or dispose of their illiquid assets, and so were exposed to losses; and the problems of liquidity for the companies that dealt in this MBS because they depended wholesale backing from the financial market. These issues had serious consequences on the US economy (Kellaway, 2009). For example, Northern Rock plc that operated a business model of using securitisation to back mortgages, faced a serious liquidity challenge and in September 2007 sought after a distinct lending package from the Central Bank in order to take care of its liquidity situation. However, after failing to get a reasonable private sector resolution, the company was nationalised in February 2008.

The crisis because severe when disbelief in the markets increased sporadically, partly as a result of Lehman Brothers' failure. After the collapse of Lehman Brothers, banks funding started contracting at a rate of 100billion euros a year, a sharp contrast to its prior expansion rate that was expected to go up to 600billion euros in 2007 (Cour-Thimann and Winkler, 2013). The effect of this was not only felt in America as other European countries were affected causing massive bailouts for financial corporate giants or nationalisation of these companies. In Europe, Holland, Belgium and Luxembourg administrations made equity injections in order to save Fortis. Similarly, the governments of France, Luxembourg and Belgium also made equity injections in an attempt to save Dexia, while the three major banks in Iceland were nationalised

Furthermore, in the United Kingdom, policy makers resolved that a financial house called Bradford and Bingley (UK) could not the financial criteria to act as deposit taker anymore, and so the company was nationalised. After that moment, there were a lot of rescue and support procedure put in place in different countries. The government of the United Kingdom publicised similar packages in late 2008.The method applied by the United Kingdom was to recapitalise affected banks by way of preference shares. Several banks such as Lloyds TSB, the Royal Bank of Scotland group Plc., and HBOs traded preference shares with the government. In January 2009, the government of the United Kingdom announced a second package to support businesses (Kellaway, 2009).

3.5.3.1 Response to the Financial Crisis

The initial response of the United States Federal Reserve was with monetary policy. They started by lowering the federal funds target rate. They also lowered the target rate from 5.25% to 2% in September 2007. And after the bank panic, it was further dropped to approximately 0.25% (Robinson and El Nasser, 2010). The policies the Federal Reserve utilised to reduce the effect of the financial crisis was known as quantitative easing[6]. QEI was introduced in late 2008, while QEII in introduced late 2009 and a subsequent operation twist[7] was introduced in 2011. The operation twist policy required obtaining significantly huge quantities of targeted securities such as MBS, agent debt securities (enabling financial agencies to be able to back the mortgage market), commercial paper, money market, mutual fund securities, and medium and longer term treasury bonds. The total Federal Reserve assets skyrocketed from $0.91

[6] Quantitative easing refers to a situation whereby Central Banks buy or sell government securities to banks in order to either expand or contract the money supply and lower short term interest rates.
[7] Operation twist refers to a situation whereby the Federal Reserve sells short term government securities and purchases long term government securities in an effort to lower long term interest rates.

trillion in of September 2008 to about $2.2trillion on November of 2008. Most of this additional funding was soaked by banks in form of excess reserves, which rose from approximately $2billion in August 2008 to $0.77trillion in December 2008 (Robinson and El Nasser, 2013).

The bank panic created distrust between banks and the public but also among other banks. In Europe, investors had reservations about the financial strength of their counterparts in the interbank market. This forced the money markets' rate upwards and put pressure on the resolution about the suitable interest rate transmission by the European Central Bank (ECB). Since the interbank market tension began in August of 2007, the ECB provided lots of funds so as to meet the demands of member countries' banks, while at the same time helping them to improve their liquidity, which would eventually reduce uncertainties about domestic banks' liquidity situation. The ECB above all else provided overnight loans to banks, assigning about €95billion in August 2007.

The European Central Bank also organised additional refinancing actions with maturation date of about six (6) months, as against the maximum period of three (3) months prior to the crisis. In order to lessen uncertainties about banks' liquidity position during the early periods, any offers above the preceding programme's marginal rates were selected in last refinancing programme of that period. Also, provisional swap lines were created in collaboration with other Central Banks in order to moderate the growing pressure on the American funding markets. (Cour-Thimann and Winkler, 2013).

After the Lehman Brothers went bankrupt in September of 2008, a panic arose about the financial positions of major global banks, which led to a severe decline in activities of both the financial sector and economic activities. Prior to the crisis, banks had accumulated great liquidity cushions and to protect themselves from risks associated with balance sheets and lending situations. Given the essential significance of banks in providing finance in the euro region, and the ECB's monetary policy application, the liquidity problems were disturbing with respect to credit crunch and the dangers of monetary authority's incompetence in protecting the financial market. The ECB like other major Central Banks around the world decreases vital interest rates to really low levels, however, a key component of the ECB's solution was to maintain its effectiveness in controlling monetary conditions comprised of non-standard policy recommendations. The objective was to main the preservation of price stability, continue to maintain stability in financial situations, and regulating the fall of the real economy (Cour-Thimann and Winkler, 2013).

3.5.4 **Euro Area Sovereign Debt Crisis**

The European crisis was an aftermath of the global financial crisis. The GFC of 2007-08 served as the trigger that debt contagion across Europe eventually causing a sharp decline in growth. As interest rates fell, it gave rise to excess borrowing that left commercial banks in serious debts, and left governments with huge fiscal deficits and high public debts among countries in the region. With a view of meeting liquidity problems that arose from the global financial crisis, the European Union (EU) organised a meeting in Paris in October 2008, to come up with a collective action for the Eurozone and settled on a bank rescue package to increase their funding and secure interbank lending. The effort to manage the crisis was viewed as an essential step to avoid a situation whereby actions of one-member nation hurts other member nations ability to provide credit and liquidity to their indigenous banks.

Towards the end of 2009, Greece acknowledged that their fiscal deficit was undervalued. They disclosed actual figure of 12.7% of GDP, compared to the 3.7% stated in a previous meeting. In the same vein, Greece's public debt in 2009 was disclosed to be about 113%, which was above Eurozone threshold of 60%. In the same period, there was lack of confidence by investors resulting from high fiscal deficits and that the sovereign debt was composed of risky insurance and CDS. As at 2010, a sovereign debt crisis had ensued in the euro zone and Greece was the most affected at that point. Subsequently, similar issues had started in Ireland, Portugal and Spain. Despite the fact that the composition of fiscal deficit, public and private debts, as well as conditions for bank lending were substantially unalike across the member countries, their financial sectors operated in identical fashion mostly using CDS premiums (Anand et. al, 2012). In order to reassure investors' confidence, on May 2 2010, the European Union and International Monetary Fund developed a bailout strategy worth about 110billion Euros for Greece which was dependent on their ability to cut government spending and raise taxes.

The bailout strategy was accompanied by another strategy that was agreed in May of 2010. This strategy was decided by the 27-member nations of the EU, and it was to start an initiative, referred to as European Financial Stability Facility (EFSF). The aim of this initiative was to assist with the preservation of financial stability in the Euro area by offering financial support to member countries in crisis.

The EFSF had authority to trade securities and use these funds acquired to provide loans up to 440billion euros for EU member countries. The securities traded were supported by guarantees provided by the European commission on behalf of the entire European Union, the eurozone member nations, and the IMF. The EFSF added a €60billion worth of loans from the European Financial Stabilisation Mechanism (EFSM) and a 250billion euros loan funded by the IMF in an attempt to have a financial buffer. The arrangement enabled the ECB to procure government debts in form of bonds. In connection with the agreement in May 2010, Greece was able to gather $70billion through the sale of government enterprises to the private sector. Furthermore, in November of 2010, the European Union and IMF agreed to bailout the Ireland with €85billion, while in April of 2011, Portugal declared that they can no longer deal with their financial obligations and sought assistance from the EU. Subsequently, in May of 2011, the finance ministers of member nations approved a 78billion Euros rescue loan to Portugal (Anand et al. 2012).

Another surprising meeting was organised once more in July of 2011 in Brussels. The heads of states agreed on actions to end the spread of the crisis. They concluded that another bailout of 109billion euros would be helpful to for Greece. Therefore, in conjunction with the IMF and contributions from private investors, they were able to raise that money as a way of bridging the financial gap. The EFSF was a key financial agent, while the IMF and ECB undertook regular assessments. The agreement also incorporated extension of the maturity dates of loan repayment and also decrease in interest rates. In a bit to avert the perceived contagion, the heads of states decided to raise the flexibility of the EFSF so as to enable them to give loans to member nations as a precautionary initiative.

The EFSF was given the ability to recapitalise financial institutions by issuing loans to governments even if those countries are not part of the initiative. Furthermore, the EFSF was given the permission to interfere in secondary market activities in order to create an excellent financial markets situation, in case of financial instability circumstances. In order to raise fiscal consolidation and economic growth level within the euro area, the representatives of those countries agreed to continually support implementation of EFSF agenda. The representative also decided to give Portugal and Ireland the kind of package that was provided to Greece such as debt maturation period of 15 years also to reduce interest rate to about 3.5%. They further decided that all the Euro member countries have to strictly observe stipulated fiscal objectives.

Along with dealing with possible macroeconomic fluctuations and crisis, the member states (apart from the ones under the EFSF plan) agreed to decrease their deficits under 3% by 2013. The representatives of the EU member nations also requested that the European Investment Bank (EIB) support the nations seeking financial assistance from the EU and IMF. This happened because the Euro area had a special institutional arrangement in the form of the European Union, and because they cannot dictate the exchange rates, there was tension on employment levels in some of the member countries. This resulted in some member countries attempting to improve those employment burdens with fiscal spillage. The ensuing debt levels had been aggravated by the global financial crisis, which later contributed to the financial instability in the region (Blundell-Wignall, 2012).

In late 2011, the euro banking system gradually became under pressure because of the numerous interactions between the ECB and national banks, which exposed those individual countries to sovereign risks. Therefore, as the price of sovereign bonds reduced, national banks' balance sheets were also affected. Consequently, investors began to have concerns over the ability of several national banks within the region to meet their financial obligations, and at the same time, concerns arose over the capability of the European Union to support impending crisis. This caused the bond prices of the sovereign organisation to fall even more, affecting not only Greece, Portugal and Ireland but it also put a stress on other economies like France, Belgium and Austria. The national banks' equity prices decreased by approximately 70% in 2011, and the credit default swaps was more than that of Lehman Brothers. In a lot EU member countries, the funding from the union ceased, and their national bank's guarantee of bonds was seriously limited (Cour-Thimann and Winkler, 2013).

Therefore, the European Banking Authority came up with further capital boost and increase the Core Tier-1 capital ratio[8] to 9%. It was supposed to be a stabilising programme, but it ended up initiating a necessity for funds in the European banking system of over 100billion euros that had to be raised before 2012. Speculators projected a deleveraging risk of over 1trillion euros, because banks would lessen their weighted risk assets in order to better their equity ratio (Cour-Thimann and Winkler, 2013).

[8] Tier 1 Capital ratio is a measure of a bank's financial strength by regulators such as the Basel Committee. It is the comparison between banks' core equity capital and total risk-weighted assets. A core firm's capital is the sum of their equity capital and disclosed reserves while risk-weighted assets include all assets that the firm holds that are systematically weighted for credit risk.

In an attempt to increase investors' confidence and to provide an efficient monetary policy system, the European Central Banks started its Securities Markets Programme (SMP) for ensuring that liquidity is available in the sectors that were not functioning properly. With the SMP, economic interventions by the EU can be easily done in both public and private debt securities markets. According to the treaty, involvements in sovereign bonds markets would be solely to secondary markets (Cour-Thimann and Winkler, 2013). Sovereign bonds held by the ECB through the SMP reached 219.3 billion Euros in February 2012 (Kang, 2015aka).

Even though the initial problems that arose from the sub-prime lending were observed first in the USA, the impact on the financial sector mostly felt in Europe, particularly in the United Kingdom and the Euro area, as financial institutions that survived in those areas lost significant amount of money and assets. It was projected that 51% and 70% of the total market capitalisation of the 10 of the biggest banks in Europe as well as insurance companies respectively, were lost at the peak the crisis and led to a subsequent worsening in investor's confidence. At institutional level, the decrease in market capitalisation ranged between 30 and 96% (SESRIC, 2011).

With regards to the debt levels, the gross government debts in the Euro area reached from 69percent of the total GDP in the starting three months of 2007 to 85.5percent in the last three months of 2010. Also, as at June of 2011, the average government debt of the Euro area was about 87.3percent of the total Euro area GDP. For the case of Greece, government debt as percentage of GDP rose to about 152% in 2011, while the quickest rise in the government debt took place in Ireland where it was 24.8percent of

GDP in March of 2007 but had risen to 102.4percent of GDP June of 2011 (SESRIC, 2011).

As the sovereign debt crisis continued to affect the real economy, several European nations experienced a large unemployment rates, some of which was caused by the austerity measures proscribed by the EU and IMF, which resulting in a large about of workers' turnover. In 2001, the unemployment numbers for Greece, Ireland and Portugal were 17.1%, 14% and 12.5% respectively in June 2011 (SESRIC, 2011). Spain on the other hand faced the highest unemployment rate with 21.3% in same period. Furthermore. It was observed that countries that had their national currencies pegged to the euro suffered high rates of unemployment when contrasted countries who had floating exchange rate regimes (SESRIC, 2011).

3.5.4.1 **Response to the Sovereign Debt Crisis**

The European Union is not a federal union and therefore operates under a treaty. The treaty included several agreements and corrective measures for affected member countries. The provision included the prevention of bailouts by national Central Banks; the restriction of special access certain public institutions, governments and financial institutions; nonexistence of bail out clause; and the Stability and Growth Pact (SGP, which is considered to be distinct from the Treaty itself) (Cour-Thimann and Winkler, 2013). The EMU under the Maastricht regime was designed for stability mainly through price stability-oriented monetary policies of ensuring that inflation rate is kept under but around 2% along with comprehensive public finance, i.e., government debt of 60% and budget deficit lower than 3% (or as stated otherwise by the SGP).

According to Anand et al. (2012), the formation of the euro area had a fundamental paradox in that it is a monetary union and not a fiscal union. The establishment of the current currency (The Euro) specifically prevented the European Central Bank or member nations' Central Banks from funding government deficits. However, one of the methods employed by the EU included raising the minimum amount of bank capitalisation in order to promote stability and their capability to handle shocks. They also created the European Financial Stability Facility (EFSF). This was arm was created in 2010 for the purpose of raising the required funds that the union might need to provide assistance to member countries in distress, and also to buy government debt as well as provide financial assistance to banks. The EFSF is unanimously backed by all the members of the Euro area. Another initiative was also introduced in 2011 called the European Financial Stabilisation Mechanism (EFSM). This initiative was formed to enable the European Commission to acquire needed funds while using the European Union Budget as a security. The EFSM can lend funds in association with the EFSF and the International Monetary Fund.

3.6 **LESSONS LEARNT FROM THE DISCUSSED CRISES**

There are several similarities between all the crises discussed above such as the dangers of pegging your currency to a particular exchange rate regime, loss of investor's confidence, inability of banks to carry out their financial obligations, bail out of large corporation among others.

The patterns of the crises are similar to the findings of Lai (2003), who listed some common features that occur during a financial crisis. They include economic peak before crisis, banking crisis and loss of investors' confidence, all features which were prevalent in the various crises discussed in previous sections.

Prior to those crises, there were periods of boom or economic expansion. This was the case for the great depression, the Asian crisis and the Global Financial Crisis. Similarly, all the crisis discussed resulted in the failure of both the stock markets and real estate markets and were usually introduced or followed by a banking crisis. This occurred in the case of the Asian crises, Financial crisis and the Euro Area sovereign debt crisis where major banks needed a bail out. Those financial instabilities were also characterised by loss of investors' confidence which manifested itself as a capital flight.

Despite these similarities between the crises, there were several and significant contrasts between the economic and financial systems of the United States in the 1930s, East Asia before 1997 and that of the USA and Europe prior to 2007. The dissimilarities could be the reason why some policymakers concluded that the kind of crisis that the East Asian countries experienced is not likely in happen in industrialised countries (Hale, 2011).

Firstly, the financial sectors of industrialised countries are a lot more advanced, and the regulations are tougher than that of those Asian countries. The changes in regulations suggested for the Asian countries were intended to make their economic and banking regulations in accordance to that of industrialised nations. For instance, financial analysts suggested that the banks in East Asia align their capital ratios in accordance with the Basel Accord adhered to by industrial countries. In other words, industrialised countries' financial sectors were in an improved state in 2007 than the state of the East Asian Financial sector in the boom period prior to the Asian crisis (Hale, 2011).

Another set of distinction can be seen from the perspective of an established financial sector. It can be observed that the United States learnt from the mistakes of the great depression and the fall in Gold standard and were a lot more resistant to shocks because of their strong regulations and complexity. As earlier mentioned, the impact of the Global Financial crisis was felt more in Europe than in the United States of America where the crisis originated. A well-structured and monitored financial systems should be able to perform efficiently with little supervision and more leverage. Then again, as the crises discussed demonstrated, less oversight can decrease transparency.

3.7 **CONCLUSION**

Financial instability, according to this research, is defined as a situation where financial markets are unstable and does not have the potential to prevent or protect the economy from a financial crisis. Sources of financial instability have also been identified and explained. The sources discussed were fragility in financial institutions, asset price volatility, foreign exchange markets, equity markets, fixed-interest and real-asset markets. Attributes of those sources could be noticed in the major financial instabilities discussed, for instance, evidence of fragility in financial institutions and asset price volatility could be seen in the great depression and evidence of foreign exchange markets as a source was recorded during the great depression and Asian crisis. Foreign investors lost confidence in the financial authorities to maintain the exchange rate, therefore withdrew their investments causing exchange rate to decline. Evidence of fixed-interest and real-asset market as a source of financial instability were also observed in the great depression, Asian crisis and global financial crisis. The effect of a financial crisis on the selected West African countries will be discussed in the next chapter.

CHAPTER FOUR

CONTEXTUAL INFORMATION ON SELECTED WEST AFRICAN COUNTRIES

4.1 INTRODUCTION

This chapter discusses political economy of the West African region as well as some political instabilities that plagued the region post-independence from their various colonial rulers. Additionally, the impact of public debt, financial stability and economic growth in the West African countries used as case study were discussed. These counties are Benin, Burkina Faso, Ghana, Mali, Senegal, Niger, Togo, Cote d'Ivoire and Nigeria. This chapter also highlights the main areas that were affected by the recent financial crisis and the policy responses by their governments and Central Banks. The consensus on the areas according to literatures examined, concluded that the main channels affected were financial market and trade.

4.2 RATIONALE FOR SELECTED COUNTRIES

The selected case study countries (Benin, Burkina Faso, Ghana, Mali, Senegal, Niger, Togo, Cote d'Ivoire and Nigeria) are located in West Africa and are all members of the Economic Cooperation of West African States (ECOWAS) (see section 4.5). Additionally, seven of the nine countries (except Nigeria and Ghana) all belong to the same monetary union – West African Economic and Monetary Union (WAEMU) and have used a common currency – CFA Francs since 1945. The monetary union is responsible for making monetary policy decisions for the member states, however the final decision to implement those policies rests on the national governments of those states. Ghana and Nigeria on the other hand have their own independent central banks that makes and implement monetary policy decisions in those countries. Although the monetary authorities in these countries are supposedly independent, the president still has the power to approve or disapprove polices made by the monetary authorities. This is because these countries operate a presidential system of government where decision making is centralised and decided mostly by the signature of the president.

Irrespective of how policy decisions are taken, all those countries have similar histories. They were once colonised either by France or Britain and have also faced several political unrests either domestically or with their neighbouring countries. Those political instabilities have negatively impacted government revenue and spending, manufacturing, savings, investment, economic growth, wealth allocation and poverty in the West African region (Abu et. al., 2015). On the other hand, since they are all members of ECOWAS, all those countries benefit from cross-border trade with at minimal cost and cross-border investments. Furthermore, their export similar primary commodities like cocoa, diamonds, gold, hides and skin as well as crude oil among others. They also have similar economic trends such as trends in GDP, inflation, government spending, high rates of public debts, etc (as shown in section 6.8).

Additionally, these countries are highly indebted and there is the influence of international organisations in all of those countries. An example of foreign influence was the Structural Adjustment Programme suggested by the IMF and adopted by all the case study countries (see 4.6). Ronnback (2008) reported that these countries also receive official development aid which consist of 15%-20% of GDP in most cases (see 4.7).

4.3 POLITICAL ECONOMY OF THE WEST AFRICAN REGION

The West African region consists of 16 countries and it is the most populous region in Africa. All those countries are multi-ethnic. For example, Nigeria has over 250 ethnic groups. The commonly practised religions include Christianity, Islam, and various traditional practice. The region is predominantly agrarian with over 60% of the population living in rural areas, as majority of the countries prior to independence were exporters of primary goods such as groundnuts, hides and skin, coffee, cotton, cocoa, rubber and palm produce (Olukosi, 2001). They also possess other mineral resources such as crude oil, diamonds, gold, limestone, tin and uranium. Over the years, most countries in the region limited their export base because they became increasingly dependent on the exportation of one or two primary commodities/mineral resources as their major source of revenue. For instance, exportation of petroleum products accounts for 61% while cocoa exportation accounts for 44% of the total agricultural exports in West Africa.

All the countries in region were created during colonialism except Liberia that was founded in 1821 as the home of former slaves from the United States. Of all the countries in the region, Senegal, Cote D'Ivoire, Nigeria and Ghana appear to have improved industries based on the magnitude of their manufacturing sectors and the amount of people employed by the sector. Nigeria also has the largest economy, accounting for more than half of West African economic activities, and so, developments of the Nigerian economy is very important for the whole region. However, about 70% of the West African population live on less than $2 per day. Even though they receive foreign aid, yet it has not had any significant impact on their living conditions (Ronnback, 2008).

The region also experienced colonialism by European nations such as France, England and Portugal. Prior to the colonial era, the different parts of the region were dominated by kingdoms and empires such as the Ashanti Kingdom, Kanem Bornu empire, Sokoto Caliphate, the Benin kingdom, the Dahomey Kingdom among others. The colonialists used these established kingdoms as a means of control in nations. In Francophone[9] and Lusophone[10] countries, the main mode of control was termed policy of assimilation where the aim was to obliterate local cultures while creating black French or Portuguese people; whereas in Anglophone[11] countries, indirect rule was the method used. The indirect rule was a system whereby the traditional rulers maintained the norm of the society but also enforced taxation for the British colonial regime. Regardless of the method of colonial governance, West Africa became the first region in Africa where the earliest intellectuals emerged and the movement towards independence began. The events during colonialism inspired a larger pan-Africanist agenda aimed at reclaiming the history and identity of the continent. It was in Ghana – West Africa that the first pan-African congress took place, attracting major nationalists and intellectual African leaders (Olukosi, 2001).

Furthermore, the region comprises of a number of multinational organisations. These organisations are founded on the bases of promoting economic and/or regional cooperation. The prominent one is the Economic Community of West African States

[9] French speaking countries
[10] Portuguese speaking countries
[11] English speaking countries

(ECOWAS) which has memberships from countries of all languages. There used to be the Communaute economique des Etats de l'Afrique de l'Ouest (CEAO) which operated in a similar way to ECOWAS but strictly for Francophone countries. Additionally, there is the monetary union known as the Union economique et monetaire Ouest Africaine (UEMOA), the successor of the CEAO which is in direct competition to ECOWAS in terms of functions especially when it relates to accessibility to funds.

West Africa also has additional important attributes. It consists of one-third of Africa's population with Nigeria being the most populous, the oldest republic in Africa in Liberia and the first African country to gain independence – Ghana in 1957. One of the earliest coup d'états in Africa also took place in the region – Togo in 1963. That coup was the first of many for the region during the 1960s and 1970s. Only two countries of the 16 countries (Cote D'Ivoire and Senegal) succeeded in avoiding military rule until 1999 (Olukosi, 2001).

4.4 POLITICAL CONFLICTS AND TENSIONS IN THE WEST AFRICAN REGION

The West African countries over the years have faced increased levels of corruption and political instability, resulting in the slow pace of economic development through negative impacts on the level of investment, poverty, government income, manufacturing, rate of savings, etc. Corruption in this case refers to situations whereby economic rent is pulled out from the local economy and invested abroad. Earlier military regimes in member countries suggested that corruption and poor economic conditions was their main reason for overthrowing democratic leaders, however, they themselves have been blamed for participating in the same corruption and failed to lead the citizenry out of poverty (Abu et. al. 2015). Between 1957 and 2004, the West African region has experienced forty-four successful military coup d'état's, forty-four failed coups, eighty-two plots and seven civil wars (Ronnback, 2008)

The partition of West Africa by European colonialists also created 'manmade borders' that soon became causes of conflicts. Several tribes and ethnic groups were separated into two or three countries, nomadic lifestyles of groups such as the Fulani and Tuareg were inadequately accommodated. As a way of quelling potential conflicts that could arise from border disputes, in 1964 the Organisation of African Unity (OAU) [12] decided to recognise and accept all inherited boundaries from the colonial regimes. There have since been many border conflicts in the region such as Nigeria-Benin, Nigeria-Cameroon, Nigeria-Chad, Ghana-Togo, Mali-Burkina Faso, Senegal-Mauritania, Guinea-Sierra Leone, among others. The named border conflicts were mostly driven by the control of land, human and mineral resources (Olukosi, 2001).

After independence, most West African countries practiced a multiparty system but in some cases like Senegal, the party that fought for independence dominated until military rule spread from Togo to other countries in the region up until the late 1990s. The military regime in these countries were seen to be significant contributors to political instability in the region as successions were mostly achieved by coup d'états and violence. Politics in West Africa is dominated by a centralised system of governance whereby the central governments wield the most power and they are also responsible for the redistribution of wealth. This system made it easier for the military

[12] Predecessor of the African Union

to enforce their agenda in various countries leading to various degrees of authoritarian governance (Olukosi, 2001).

Additionally, some of the political instabilities that have plagued the region include civil wars in Nigeria between 1967 and 1970, civil wars in Liberia and Sierra Leone in the early 1990s which had serious impact on their neighbours; conflicts in Senegal which engaged The Gambia and Guinea Bissau; Bakassi Peninsula oil conflict between Nigeria and Cameroon, among others (Atuobi, 2007). Lengthy military rule in West Africa did not only spawn serious political instability, it also created the norm of militarism combined with other factors such as economic decline and rise in rebel propelled several countries in the region into war. Liberia became the first West African country to be regarded as a failed state as a result of their civil war. Francophone countries for the most part benefitted from the influence of the France government in terms of investment and the placement of military persons in positions of power, which arguably might have aided in the reduction of the pressures towards internal political instabilities such as civil wars.

Countries that have faced armed conflicts have shared common characteristics. They are typified by extreme poverty, low levels of education, less developed industries, highly indebted and sometimes reliant on agricultural production. They are also highly susceptible to fluctuations in the global economy. Economic slumps and social disruption trigger and prompt armed conflicts. Among the fifteen ECOWAS countries, twelve of them have faced armed conflicts since their independence where human rights violations were widespread. In 2004, nine ECOWAS states were plagued with armed factions. Those factions sprang up for different reasons such as religious, ethnic, financial, anti-state, etc. Since 2005, the only ECOWAS states not affected by conflict are Ghana, Cape Verde and Burkina Faso (Ronnback, 2008). Even though some of the West African countries survived their various and, in some cases, numerous political instabilities, their economy and polity took a while before it returned to the good economic conditions.

Three of the major political conflicts and tensions that affected the entire region are discussed below.

i. **The Nigerian Civil War**

The Nigerian civil war is regarded one of the bloodiest civil wars in West Africa with a reported three million deaths and widespread malnourishment, starvation and destruction. The civil war occurred in the south-eastern part of Nigeria from July 6, 1967 to January 15, 1970.

In January 1966, the Military government of General Aguiyi-Ironsi forcefully took power from the then civilian government in Nigeria. That coup was significant because it saw the death of Nigeria's first prime minister, Sir Abubakar Tafawa Balewa as well as other regional leaders – Sir Ahmadu Bello (Premier of the Northern region) and Samuel Akintola (Premier of the western region). Prior to that coup, Nigeria operated a regional system of governance where each region took care of their needs and the Premiers were the regional leaders. After the coup, the system was changed to a unitary system of government where the centre is responsible for executive duties and the allocation of resources.

In May 1966, General Aguiyi-Ironsi implemented the 'Unification Decree' that eliminated the regional civil service and introduced a unified national civil service, which was a major modification from the federal system of government employed by the British colonial government to protect the large and poor Northern population after independence. However, the Northerners appeared not to be happy with this decision, they saw it as a tactic to assert Igbo domination over the region (The Head of state, General Aguiyi-Ironsi was Igbo). The North was predominantly Muslim Hausa/Fulani. Consequently, there was widespread rioting in the Northern region resulting in the killings of hundreds of Igbos. In July of 1966, there was another coup d'état resulting in the overthrow and assassination of General Aguiyi-Ironsi by Northern Military officers and Colonel Yakubu Gowon assumed the position of Head of State, even though he was a Christian. Colonel Gowon was also warned by the British High Commissioner and the United states Ambassador about the consequences of a potential separation of Nigeria on the Northern economy (Uche, 2008). He was the Head of state of Nigeria from 1966-1975 and was also the first Head of ECOWAS.

The main reason for the civil war was that Igbo people of the Eastern region wanted to be separated from Nigeria to become an independent nation called Biafra Republic. The leader of this movement, Lieutenant Colonel Chukwuemeka Odumegwu-Ojukwu was an appointed military governor of then Eastern region in 1966 under the government of General Aguiyi-Ironsi. In May 1967, the Head of State, General Gowon made a decree dissolving the regions as well as their regional leaders, replacing them with twelve states (Kirk-Greene, 1975). The dissolution of regions meant that the aspiring Biafra now consisted of three states instead of the entire Eastern region – South Eastern state, East Central state and Rivers state. Two of the three states had internal tribal conflicts – Ibibio/Efik disgruntlement and the Rivers-Calabar-Ogoja conflict, while the third state was landlocked and oil-less. In early 1967, there was an agreement between the federal government of Nigeria and Shell-BP (Nigeria's Largest Oil firm at the time) had an agreement to stop making royalty payments to the East region, even though 75% of its operation was in that region. This meant that the would-be Biafra would have no royalties from oil. This reportedly was one of the reasons for Ojukwu's call for a secession from Nigeria. Another reason was the mass killing of Igbo military officers in July 1966 by Northern soldiers.

Additionally, there was the issue of distribution of wealth which began in the colonial era but was not changed prior to the war. For instance, there was a policy called Northernisation where priority in employments and royalties were given to Northerners, which meant that the Southern and Eastern regions in Nigeria at the time had high rates of employments and low standards of living compared to their Northern counterparts. Religion and Tribalism also had a role in the genesis of the war. Northern Nigeria were predominantly Muslim Hausas and Fulanis, while the East were predominantly Igbo Christians, which reflected throughout the civil service and the composition of the Nigerian army. As a result, there was heightened discriminations along religions and tribal lines (Kirk-Greene, 1975). Religion also played a big role in the determination of what side to support during the war. Since General Gowon was from the North, even though he was not Muslim, other northerners and soldiers who were Muslim supported him; and since most of the Head of States of Neighbouring countries were also Muslim, they were encouraged to join the cause of a united Nigeria. In southern Nigeria, the Christian population for the most part were indecisive in their support, however there were some who were supportive of their fellow Christians in Eastern Nigeria (Gowon, 1984).

According to Gowon (1984), the civil war was a test of loyalty and commitment from neighbouring francophone countries. Commitment from neighbouring countries was important because Biafra received help from a superpower – France. General de Gaulle of France revealed in 1968 that they were in support and assisted the Biafran regime. Niger, Togo, Mali and Cameroon were vocally opposed to recognising Biafra as a separate and independent nation, whereas Cote D'Ivoire were in support of the Biafran regime and gave Lieutenant Colonel Ojukwu political asylum after the war. The support of Cameroon was important to Nigeria because of its proximity to the Eastern region, this weakened the ability of Biafran soldiers to get access to weapons. Gabon supported the Biafran republic initially (because of the friendship between President Bongo of Gabon and President Houphouet-Boigny of Cote D'Ivoire) but later changed their stance. Therefore, Cote D'Ivoire was the last Francophone country in the West African region to support the secession in Nigeria. This created a break in diplomatic ties between Nigeria and Cote D'Ivoire. While in East Africa, two countries were in support of the Biafrian secession – Tanzania and Zambia.

On the other hand, from 1968 until the end of the civil war in January 1970, there was uncertainty about the loyalty of certain Anglophone countries, notably Ghana and Sierra Leone. Sierra Leone gave a military base to Biafra soldiers and were allowed free entry and exit into the country. Sierra Leone also criticised the policy of Nigeria in the Organisation of African Unity's summits of 1968 and 1969. Ghana's relationship with Nigeria became estranged at the start of the civil war. This is because their first

Military president General Ankrah tried to proffer solutions to Nigeria's problems, which the Nigerian government did not take lightly. The relationship between the countries then improved after he was succeeded by General Afrifa in April 1969. Since General Afrifa and General Gowon both went to Sandhurst, they got along really well and there was a cordial relationship between both countries.

However, in October of 1979, Ghana transitioned from a Military rule to a civilian one and Dr. Kofi Busia became the Prime minister. As part of a new policy, foreigners residing and working in Ghana were expelled within a short period between 1969 and 1970. About five hundred thousand Nigerians were among those expelled. This expulsion coincided with the end of the Nigerian civil war, putting pressure on the efforts to reconstruct and resettle citizens, and hence, cooperation between the two countries grew even more challenging (Gowon 1984).

By the end of the Civil war, there was an international relation crisis between Nigeria and some other countries in West Africa and efforts were made to repair them. The crises were resolved through the OAU, CEAO and ultimately, ECOWAS.

ii. <u>Ghana, Guinea and Cote D'Ivoire Conflict</u>

The Nigerian civil war was not the only political instability to disrupt the region. The military takeover from Dr. Kwame Nkrumah (Ghana's first prime minister, first president and renowned Pan Africanist) in February 1966 also created political tension in the region. The new military regime of General Ankrah reversed a previous partnership between Guinea and Ghana, while aggravating tensions between Guinea and Cote D'Ivoire.

President Sekou Touré (the first president of Guinea), gave Kwame Nkrumah sanctuary in Guinea and also moved to reinstate Nkrumah as Ghana's leader, directing his army through Cote D'Ivoire. Therefore, Cote D'Ivoire and Ghana also moved armed troops to their borders in anticipation of an attack, where they stayed until April 1966. As a result of Sekou Touré's move, Houphouet-Boigny (Cote D'Ivoire's president) had to seek guarantees from France and the Conseil de l'Entente[13] that in the case of an assault by Guinea, they would respect the terms of their joint defence agreements. However, the attack did not happen because Guinea were not able to support a military mission of such magnitude (Gowon, 1984).

On the other hand, the overthrow of Kwame Nkrumah strengthened the Conseil de l'Entente, aiding Togo in making a formal entry into the Entente in June 1966. After Togo's independence, there was a territorial dispute over the Ewe population with Ghana emanating from the colonial era. During the colonial era, Britain and France divided West Africa among themselves and drew up the borders, in most cases, separating tribes into different countries. In this case, the ewe population was divided into British Togoland and French Togoland. After Ghana's independence in 1957, there was a transfer of territory and population from the British government to Ghana but when Togo gained independence in 1960, the Ewe of Ghana started a movement to re-join their compatriots in French Togoland. However, Kwame Nkrumah was opposed to the idea. Since Ghana had the backing of Britain, Togo had to look for

[13] Conseil de l'Entente is a union of five francophone countries – Benin, Burkina Faso, Cote D'Ivoire, Niger in 1959 and later Togo in 1966.

backing from Cote D'Ivoire and other francophone countries. This dispute caused several clashes and unrests for over thirty years.

As mentioned earlier, Sekou Touré of Guinea and Kwame Nkrumah of Ghana had a good relationship, and so after the Nkrumah's overthrow, Guinea saw itself gradually isolated. Even though Touré moved to reinstate Nkrumah, most African leaders were opposed to military interference as a way to resolve political and social issues. Diplomatic ties were also cut off between Ghana and Guinea. Similarly, the relations between Cote D'Ivoire and Guinea did not improve after the removal of Nkrumah, especially since Guinea attempted to restore him to power and moved their armed forces through Cote D'Ivoire.

Promptly after the Ghanaian coup d'états overthrowing Nkrumah, Guinea put the Ghanaian ambassador in Conakry under house arrest, denying his return to Accra. By February 1967, nationals of both countries were arrested and held in custody in a series of retaliatory acts that could have gotten worse, especially after the abduction of Guinea's Minister of Foreign Affairs, Secretary to the foreign minister and other diplomats who boarded a Pan-American Airway jet headed for Addis Ababa in Accra – Ghana. General Ankrah of Ghana declared that the Guinean diplomats who were on their way to attend the 1966 OAU summit would be detained until eighty-five Ghanaian detainees in Guinea were allowed to return to Ghana (Gowon, 1984; Meyers, 1974). The response of the Guinean government was quick. President Sekou Touré held the US government responsible for the abduction and arrests and demanded that the US lodge a strong instantaneous protest in Accra-Ghana; and secondly, that they facilitate the release of the Guineans and transfer them to their destinations (Skurnik, 1967).

A number of factors contributed to the Ghanaian government's detention of Guineans. The chief factor being the forceful and constant hostility shown by Sekou Touré towards the new Military government in Ghana. Not only did Guinea offer Nkrumah shelter after the was exiled, they also provoked Ghana by making Nkrumah the co-president of Guinea. Besides that, Nkrumah declared on arrival in Guinea that he intended to return to Ghana and will teach the military personnel who overthrew him a deserved lesson. After those actions, the Ghanaians did not see any difference between the provocative utterances by Nkrumah or actions taken by the Guinea government. Both sources also publicly called on Ghanaians to rebel and eject the new government of General Ankrah since President Sekou Touré did not see the new government as a legitimate one. Furthermore, Guinea seized Ghanaian properties in Conakry and sanctioned Nkrumah's withdrawal of Ghanaian public funds from a Guinean bank. The final motivation for Ghana's detention of Guineans was that the Ghanaians wanted to put pressure on the Organisation of African Unity (OAU) to step in and play an active role in the freedom of previously arrested Ghanaians (Skurnik, 1967).

However, in a bid to avoid further conflict and a possible War in the region, Hamani Diori (President of Niger) and Modibo Keita (President of Mali) in July 1967 facilitated a successful meeting to settle the tension between Guinea and Cote D'Ivoire and an exchange of detainees took place in September 1967. Also, the Guinea-Ghana conflict was resolved in Addis Ababa in an ad-hoc meeting of some African leaders in November 1967 (Gowon, 1984; Skurnik 1967)

iii. La Francophonie

Post independent francophone West African countries had a tight and one-sided relationship with their former colonialist - France. It was General de Gaulle of France's policy to strengthen and increase the imprint of France in Africa. That policy continued even after his resignation in 1969 and continued under his successor, President Georges Pompidou. Regardless of the continuity of France's policy, occurrences in the 1960s were not altogether encouraging for the francophone countries because they dreaded a weakening or termination of French economic and technical aid.

During that period, France experienced increased domestic pressure to reduce economic commitments in its colonies and former colonies. The indifference of many French nationals to the issues and events in former colonies were made known through the principles of 'cartierism'[14] became an increased source of anxiety for Francophone African countries. This anxiety did not get any easier for the Francophone countries as there were drastic cuts in France's budget for foreign aid for the purpose of increasing their domestic spending to alleviate social unrest in France (Gowon, 1984). Moreover, France also became reluctant to provide troops in support of francophone leaders because of the domestic pressure. There was also the unanticipated and contentious decision to devalue the currency of francophone countries – CFA Francs without consultation, after the resignation of General de Gaulle. These events were the first

[14] Cartierism, also known as 'cartierieme' was a principle that colonialism or economic aid to former colonies is not good business.

signs of a new and different relation between France and her former colonies for the next couple of decades.

Even though economic aid and technical cooperation was the main concern for many West African francophone states, President Houphouet-Boigny of Cote D'Ivoire and President Senghor of Senegal had other ambitions which ultimately required the authorisation and backing of de Gaulle of France. For instance, in 1967 as Nigeria headed towards a civil war, the Cote D'Ivoire president wanted France's support to help secure the separation of Biafra from Nigeria as well as his ambition for leadership of the West African region (Gowon, 1984). Senghor also wanted de Gaulle's authorisation and backing to create an international francophone community where France would also be an active participant, and he will be a leader of the organisation in some capacity.

However, to their dismay, France under the leadership of General de Gaulle did not intervene and left the initiative to those West African presidents. When he later intervened, it was different from what the leaders hoped for. General de Gaulle's late involvement in the Nigerian civil war in 1968, was in promotion of secession but withheld the official recognition of Biafra, which was counterproductive. And so, both France and Cote D'Ivoire governments eventually had to reach an agreement with the military government of Nigeria. The remainder of the West African francophone countries on the other hand were in support of the Nigerian military government, primarily to avoid a complete diplomatic cessation between Nigeria and France; to discourage de Gaulle supporting the Biafran secession, and the later facilitate reconciliation between Nigeria and Cote D'Ivoire.

The idea of 'Francophonie' was discussed at the OCAM[15] summit in June 1966. At that summit, President Senghor of Senegal laid down his proposal for an organisation comprised of independent French African colonies, the Maghreb countries, Madagascar, Belgium, Switzerland, Cambodia, Laos, Vietnam and Canada (Alexandre, 1969; Gowon, 1984). La Francophonie was intended to be what the Commonwealth was to former British colonies. Unlike the Commonwealth, emphasis was placed on language as a condition for participation. The emphasis on the language criterion was because of de Gaulle's affinity for supporting and protecting all French people irrespective of whether they are from France or French colonies (Therien, 1993).

Although the initiative received a lot of support from non-African French states like Canada, the African contingencies had some reservations. Guinea was the first to speak out in 1967, when President Sekou Touré labelled 'la Francophonie' an effort to undermine African interests. According to him, it was an effort to preserve the economic overpowering of African nations that sought to eradicate themselves from the colonial oppression. Cameroon was also not in support of the outfit mostly because they were a bi-lingual state (English and French) and therefore they were not willing to be integrated into a pure French-speaking organisation (Gowon, 1984).

Furthermore, Francophonie did not receive full backing from de Gaulle of France and so the proposed first conference scheduled for December 1966 did not take place.

[15] OCAM is an international organisation of 15 countries that were former French Colonies. The acronym stands for Afro-Malagasy-Mauritian Common organisation.

France's reluctance was based on the fact that the organisation would require France to be a dominant partner, echoing colonialism (Alexandre, 1969). Also, France were not keen about Francophonie because of the economic issues in Africa as they were trying to cut off all economic aid to former colonies. Francophone West African countries during the 1960s always sort for economic support from France, even though African leaders insisted on their political independence. Therefore, by the middle of 1968, la Francophonie was overtaken by the more pressing concern of the Nigerian civil war, which caused a division among the Francophone leaders, with Cote D'Ivoire and its allies in a minority.

4.5 THE ECONOMIC COMMUNITY OF WEST AFRICAN STATES (ECOWAS)

The Economic Community of West African States (ECOWAS) started in 1975 with sixteen (16) member countries comprised of Anglophone, Francophone and Lusophone speaking countries, but currently has fifteen (15) members[16]. These comprises of two Lusophone nations (Guinea Bissau and Cape Verde), five anglophone nations (Nigeria, Ghana, Gambia, Liberia and Sierra Leone), while the rest are francophone nations (Senegal, Mali, Guinea, Benin, Cote D'Ivoire, Togo, Niger and Burkina Faso).

The main criticism of regional economic integration prior to ECOWAS was that it benefitted only powerful countries and does little to protect poorer member states, also that the advantage of low-tariff or no-tariff barrier is short-term because other regional

[16] Mauritania withdrew in 2000.

blocs would emerge and subsequently, tariffs are raised by all sides. Despite those criticisms, governments of West African countries viewed regional economic integration as a more practical solution for the subregion because it was seen as a reliable way of achieving improved standard of living for member countries at the time. They were of the opinion that regional integration enables poor countries attract investment on more favourable terms, improve diversification of their economies, reduce social and political strains between countries and harmonise their policies for better economic standing. The challenge of the economic integration in West Africa was diversification of trade. The economies of member countries were not automatically stimulated either commercially or through manufacturing as there were little industries to start with. Also, the countries were largely competitive because they produced similar goods at similar prices for the same destinations in Europe (Gowon, 1984).

ECOWAS started in 1975 as a reaction to colonialism and epitomised the start of collective self-sufficiency. ECOWAS was specially created to eliminate the artificial obstacles to trade and development that was operational during the colonial era (Gowon, 1984). The principal purpose of ECOWAS is to stimulate cooperation and integration among West African countries as well as improve the standard of living and economic growth of member states. Other objectives were added later on such as Non-Aggression protocol – 1978, mutual assistance on defence – 1981, establishment of a Community Parliament – 1993, among others (Ronnback, 2008).

In the early seventies, Nigeria was a fast-growing nation with huge prospects and their Francophone neighbours sought to be partners and valued allies in economic development. Therefore, by the time ECOWAS was created, economic integration was already in progress by member countries (Gowon, 1984). Chambers et. al. (2012) reported that the pace of ECOWAS is somewhat determined by decisions and non-decisions of Nigeria. Not only was the country instrumental in ECOWAS' creation, they were a driving force for several landmark agreements, and it plays a role of keeping the peace and security in the region. Therefore, there is a view that Nigeria's commitment to the regional integration is unmatched. Nigeria also accounts for 73.5% of all ECOWAS exports due to its crude oil exports and large economy; followed by Cote D'Ivoire and Ghana which accounts for 8% of the total exports respectively.

Unlike other economic integrations, ECOWAS was not formed for the purpose of being a strong regional administration for member countries, rather, member states are responsible for making their political decisions and implementing economic decisions (Gowon, 1984). For example, Nigeria's trade policy is protectionist, imposing high tariffs and bans on imported items change often. Consequently, this proved to be a major challenge for the body. This is because a genuine commitment by individual member countries to the regional integration process is vital for the body to achieve its objective of regional integration. However, the level of commitment by member countries appeared doubtful. This could be seen in part when there are changes in governments or elected officials in member countries. The freshly elected leaders are usually enthusiastic about establishing their unique landmark so as to distinguish themselves and their policies from predecessors, so they abandon policies previously established (Chambers et. al., 2012).

Another example can be seen from the recent global financial crisis of 2007-2009, Guinea introduced an export ban on all food commodities to nearby countries, whereas Senegal also banned rice exportation to surrounding countries. Therefore, while export and import bans were for the most part prominent during that period, they have been a common feature of policy making in the West African region and stayed that way (Engel and Jouanjean, 2015). Furthermore, high transaction costs and the high barriers to trade over time resulted in the growth of informal trade all through the region. The Benin-Nigeria border has been the most problematic in relation to informal trade, which was a consequence of Nigeria's repeated import bans and protectionist policies. The informal trade channel has caused restraints on revenues from formal trade channels across the region. In the early 2000s, illegally imported Nigerian petrol accounted for over 70% of Benin's petrol usage (Chambers et al., 2012).

The ECOWAS's role of keeping peace and security was strengthened in the early 1990s as a result of the start of Liberia's civil war. Although the intention of the Nigeria-led ECOWAS was questioned by those loyal to then Liberian opposition military leader Charles Taylor, the ECOWAS Monitoring Group (ECOMOG) was created with the aim of providing a multilateral armed force for peacekeeping missions as well as providing humanitarian support. Since the establishment of a peacekeeping arm was opposed by several francophone countries, ECOMOG has a large percentage of Nigerian soldiers and have been deployed in several conflicts within the region. ECOMOG have been deployed in Liberia, Guinea, Sierra Leone and Guinea Bissau. The deployment involved military actions versus rebel groups that oppose government authority. The missions for ECOMOG has mostly been peacekeeping such as obtaining cease-fires, generating atmospheres conducive for negotiations and protecting the general public. ECOMOG missions have been fruitful in that they were able to force rebel groups to consent to cease fire negotiations (Ronnback, 2008). Amongst its successes was the restoration of then elected civilian government of Ahmad Tejan Kabbah that was deposed by joint RUF and renegade armed forces of Sierra Leone fighters in 1998 (Olukosi, 2001).

4.6 STRUCTURAL ADJUSTMENT PROGRAMME

The West African region has experienced incompetence in their national manufacturing and trade sectors as a result of unsuitable government strategies that constrained competition and the utilisation of economics of scale.

After independence in the 1960's, the Heads of state of West African countries assumed that their private sectors were ill-equipped and so government had to perform a central role. This assumption turned into socialist attitude towards economic development in which all aspects of economic sectors were state-run. Therefore, they invested in large public-run primary industries and implemented policies to regulate prices and exchange rates, as well as restriction of trade (Heidhues and Obare, 2011). In the beginning, this approach seemed successful as there was rise in education and employment rates, huge investment in public infrastructures such as health, power and transportation (roads and ports). However, in the mid-70s, economic activities began to decelerate and echoed in the GDP as decline in growth of primary sectors, decrease in investment levels, deterioration of exports, inefficient allocation of resources and high public debts.

During the 1980s, substantial effort has been directed towards the elimination of such constraints. Several countries have attempted to implement policies that will foster national and foreign investment, develop their private sectors, boost agriculture and hence, increase economic growth. One of such implemented policies was the Structural Adjustment Programme (SAP). SAP is an economic reform programme for developing economies recommended by the IMF and World Bank. It is a policy that aims at trade liberalisation, devaluation of pegged currencies or undertaking a flexible exchange rate, diversification of the economy (so that the country does not depend on one or few goods) and promotes food security. Trade liberalisation and currency adjustment came with additional regulatory measures such as the reduction of the public sector size and expenditure, inflation rate control and provision of subsidies to manufacturing sectors (Barry et. al., 2000). The inadequate size of West African markets pigeon-holed them as price takers for their most exportable products, which means that countries in the region are highly susceptible to fluctuations in world prices for commodities.

Prior to the introduction of SAP, countries in West Africa experienced significant increase in agriculture after their independence, but due to certain events and macroeconomics strategies, the increase rapidly turned into a decline. For example, the agricultural real GDP for Cote D'Ivoire averaged 4.5% during the 1960s and 3.3% in the seventies; Ghana on the other hand also had significant rise in agricultural production until the mid-70s were it declined due to drought, fall in international prices of cocoa and heavy taxes levied on producers in order to mitigate their budget deficits. Furthermore, during the late 1960s, Mali experienced significant economic growth due to their agricultural and long-term industrial policies to the point where the Malian Franc became overvalued and unexchangeable leading to reduction in the competitiveness of local products. However, in the early seventies, attempts were made to revert Mali to a lucrative economy and producer were given incentives, but an exogenous oil shock and drought between 1972 and 1974 counteracted the potential positive effects of the enacted policies. In the periods between 1980 and 1984, food output fell by 20% and livestock by 35% (Barry et. al., 2000).

Similarly, Guinea saw decline in economic growth as a result of a fall in agricultural products and livestock from 1973 to 1981. This is in part due to the exogenous oil shock and droughts in the seventies, but it could also be attributed to poor policies by their government. The policies included poor exchange rate regimes that upset the country's exports and competitiveness; high tariffs; the state's monopoly of agricultural sector; and lack of a viable transportation infrastructure, to name a few. The ineffective policies caused a steady decline in manufacturing, agricultural production and exports, while importation of food was incessant. In the same vein, Senegal experienced economic decline in the mid-70s as a result of a fall in the prices of their chief exports (groundnuts and phosphates). Prior to this event, Senegal had a good tertiary sector and a well-paid public sector. The well-paid public sector was a big inconvenience for the country as it did not only affect government spending, but also served as yardstick for private sector wages. Therefore, when the prices of their chief exports fell, the burden of government expenditure caused a weakening of the country's current account as export decreased (Barry et. al., 2000).

The overall purpose of SAP was efficiency in the redistribution of resources with respect to comparative advantage and for this to happen, governments had to disengage from owing and controlling the production process. This is because the policies in place before the adoption of SAP were not in favour of an open economy. The basic principle of an open economy is that economic agents can respond without restrictions to fluctuations in market prices. For example, the devaluation of the CFA franc in 1994 caused changes in market structure for exportable goods, which in turn generated incentives for the demand of those goods, leading to increased agricultural productivity (Barry et. al., 2000). Therefore, SAP reform policies were targeted at trade liberalisation, diversification of the economy and beneficial exchange rate regimes across different countries. The competitiveness of West African agrarian production was inhibited by low rate of labour productivity, incapable financial sectors which results in shortage of capital, reduced access to farmable lands and water supply, inadequate transportation and distribution infrastructures as well as poor economic policies by each country. These were some of the issues that the Structural Adjustment Programme (SAP) aimed to address.

However, SAP was not successful in some countries. For example, government finance for Senegal declined between 1990 and 1994; fiscal and current account deficits also increased significantly; aggregate investment from total savings declined from -1.03% of GDP in 1991 to -3.2% of GDP in 1994. Furthermore, as a result of currency depreciation based on SAP policies, inflation of Senegal rose to 19.8% (Katombe, 2001).

After the Implementation of SAP, even though the revenue from exports rose from \$3billion to \$5billion between 1980 and 1995, poverty doubled from 17.8% to 37% even though production shifted from public to private sector (Kingston, 2011). As part of the SAP package, governments were to cut their spending so as to adjust budget deficit. However, the cuts in government spending affected key sectors such as education as wages of teachers declined, resulting in skilled teachers leaving for better employment in other countries.

Cote D'Ivoire also had public debt issues by adopting the SAP. Their debt levels grew from $7.4billion to $17.7billion between 1980 and 1990. Cote D'Ivoire devalued their currency by 50% so as to encourage exports but that action affected the economically disadvantaged as their level of savings was affected and their purchasing power fell. In a bid to curb the negative effects of SAP, Cote D'Ivoire joined other surrounding countries producing cocoa in order to regulate the price of cocoa beans by controlling supply. For instance, in 2000, Cote D'Ivoire along with Ghana, Cameroon and Nigeria decided to destroy about 250,000 tons of cocoa beans as a way to raise prices (Kingston, 2011). As a result of all the negative effects on their economies, most West African countries eventually abandoned the Structural Adjustment Programme.

4.7 IMPACT OF FINANCIAL INSTABILITIES ON WEST AFRICAN COUNTRIES

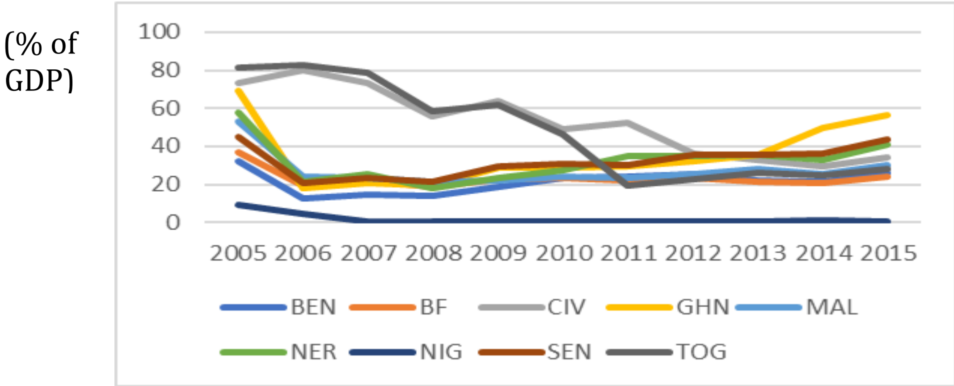
The impact of the global financial crisis and consequently, the Euro Sovereign debt crisis affected the economies of West African countries through high and fluctuating prices of commodities and foreign exchange rates, which raised investors' uncertainty levels and led to significant fall in levels of investment and trade flows (Allen and Giovanetti, 2011). The debt levels and stock market were also severely affected by those financial instabilities.

The relationship of this countries with the rest of the world and certain regions such as the European Union served as the anchor through which the financial instability filtered through. Nigeria has the biggest economy in the West African region contributing about 76.9% of the regions GDP, along with Cote D'Ivoire, Ghana and Senegal. Put together, these four countries contributed about 90% of the West African economy (European Commission, 2014), so as instabilities arose in those regions, growth rate dwindled. The main channels through which the global financial crisis and European sovereign debt impacted the growth rate of these economies are discussed as follows:

i. Debt: Prior to the financial crisis of 2007-2008, the region experienced economic growth averaging 6.5% per annum between 2002 and 2007 (Arieff et al., 2010). The growth rate was achieved due to economic restructurings and propelled by high demand for primary raw materials such as crude oil and other mineral resources such as gold, iron ore, etc. from abroad. The increased need for African primary raw materials caused investment to rise in several countries with FDI stock increased two-folds between 2003 and 2007.

Even though the sub-region was not affected directly by the global financial crisis, its effect however caught up in later periods causing a rise in debt levels. The total debt as a ratio of GDP rose from 11.56% in 2008 to 19.4% in 2012 according to the Debt Management Office (DMO, 2013). Most debts in West Africa are used on current spending and this has hindered the economic growth. The average ratio of public debt for the entire African continent according to a report by Lopes Da Veiga et al. (2015) is 81.37%. Figure 4.1 shows the trend in the external debt stock from 1970 to 2015.

Figure 4.1: External debt stock (%of GDP) between 2005 and 2015



Source: Author's computation

As shown in figure 4.1, there was a significant rise in the level of external debt stock in those West African countries from 2012. Also noticeable is the fact that Ghana is the largest debtor among those countries. However, between 2005 and 2006, there was a decline in the level of public debt because of the debt relief programs by the IMF, and also, Nigeria's ability to pay off their \$18Billion debt to the Paris Club (Igbatayo, 2011).

ii. Stock Market: The biggest and direct impact of the global financial crisis in West Africa was experienced mostly through the financial sector. There was rapid decline in the stock exchange indices as billions of dollars' worth of equity wealth were lost, resulting in a decrease in stock prices and an unprecedented economic and social experience that distressed most countries (Obayelu, (2010); Seck, (2010). Stock market indices fell by about 67% between the first quarter of 2008 and the first quarter of 2009. This fall in stock market activities and the negative effects it had on the financial sector affected aggregate demand causing financial instability in the region.

The decline in stock market activities caused a significant fall in economic activities in various countries. In Ghana, the non-performing loans to gross loans increased from 7.9% in 2006 to 8.7% in 2008. The Nigerian Stock Exchange (NSE) also lost 62.2% of its valuation between July 2008 and April 2009 (AfDB, 2009). Seck (2010) reported that for $100 worth of investment in 2007, the annual return rate in Ghana was $5.36 in 2007 but had declined to about $-15.57 as at 2009; while for Nigeria, the annual return rate as $74.73 in 2007 but had fallen to $-33.78 in 2009; and for the Bourse Regionale des Valuers Mobilieres[17] (BVRM), the annual rate of return was $77.05 in 2007 but $-25.89 in 2009, thus, resulting in capital flight by foreign investors.

iii. Trade: The financial crisis and the Euro crisis also had an effect on trade in West African countries, as the European Union is one of the main trade partners of the West African region. West African trade with the world and the European Union improved by 67% and 70% respectively during 2008-2013 period. Nigeria, Ghana, Togo, Senegal and Cote D'Ivoire accounted for 79% of the European Union exports to West Africa. 40% of the European Union's export to the West African region was received by Nigeria, another 15% received by Togo and another 10% received by Senegal. On the other hand, Nigeria exports the most to the EU contributing about 76%, followed by Cote D'Ivoire by 9% and Ghana with 8% (European Commission, 2014).

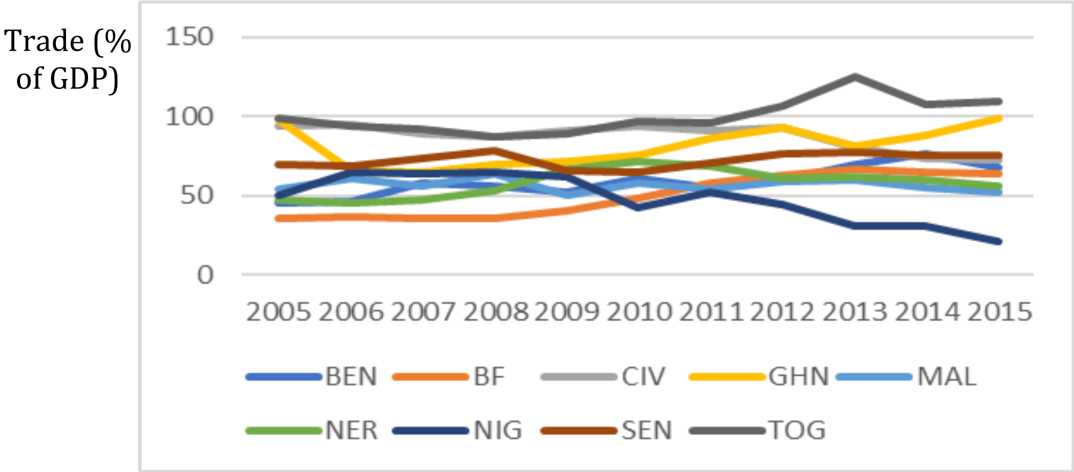
As a result of the crisis, global aggregate demand fell causing revenue from exports to drop quickly, leading to the weakening of current account balances, loss of foreign exchange reserves and a massive reduction in trade tax revenue (AfDB, 2009). The

[17] The Bourse Regionale des Valuers Mobilieres is a regional stock exchange serving Benin, Burkina Faso, Cote d'Ivoire, Niger, Senegal, Togo and Mali.

region had enjoyed strong trade relation with other countries and regions. West African countries depended on export to get foreign exchange and earnings and since there was a noticeable decline in the prices and export of key commodities from the second half of 2008, their foreign earnings also dwindled. The major export commodities for West African countries include food, agricultural products and crude oil. The commodity affected the most was crude oil, as its price declined by about 50% between February of 2008 and February of 2009 (Obayelu, 2010). Nigeria's reserves declined by 19% between September 2008 and January 2009 because of a fall in oil prices. This is because the Nigerian oil sector accounts for about 80% of its government revenue thereby affecting the country's financial stability due to widening current account and budget deficits (Ajakaiye et al., 2016).

While oil revenue sustained the economic activities of oil producing countries such as Nigeria all through the prosperous periods, the oil sector presented a major challenge during a time of crisis. When crude oil prices fell by 50percent in December of 2014 and traded close to $50 per barrel, the IMF lowered Nigeria's growth projection from 5percent for 2015 to 4.8percent. The sharp fall in the dominant oil revenue had a significant negative effect on the economy turning fiscal surpluses to severe deficits. This speaks to the dramatic effect of this experience on the Nigerian economy as employment dropped, with the level of unemployment rising from 23.9% in 2011 to 25% in 2014 (Ajakaiye et al., 2016).

Figure 4.2: Trade as a Percentage of GDP between 2005 and 2015



Source: Author’s computation

Figure 4.2 above shows the trend in Trade as a percentage of GDP from 2005 to 2015. It can be observed that the trade in those countries move in a similar way. There was a general decline in Trade activities from 2015 in most of those countries. Another example of the effect of the financial crisis on commodity prices can also be seen in the case of Mali and Ghana. Livestock and cotton make up about 80% of Mali’s exports and the prices of cotton fell by 25% in 2009 (AfDB, 2009). Also, a fall in the prices of gold and cocoa led to a worsening of the macroeconomic situation in Ghana. Public debt in Ghana rose to 70% of GDP, the budget deficit reached around 10% and the currency lost about 31% of its value in 2014. The country had to borrow heavily on current spending by increasing public sector salaries and energy subsidies, rather than spending on development (Zamfir, 2016).

iv. Exchange rate: Furthermore, there was a severe drop in the nominal exchange rates of the Ghanaian Cedi and Nigerian Naira in 2008 and 2009 than in the two preceding years. At the end of 2009, the Cedi lost 28.6% of its value while the Naira lost 20.1%

in the same period. Furthermore, the BVRM had a fixed peg to the Euro so it was difficult to ascertain the impact. Therefore, compared to the stock indices the BVRM, Ghana and Nigeria experienced a significant fall in the nominal values of their respective currencies (Seck, 2010).

4.8 RESPONSE TO CRISES

Even though the world is advancing towards globalisation, West African countries did not predominantly boost their degree of integration into the world economy compared to other regions like the EU (Seck, 2010). Before the financial crisis of 2008, there were some notable attempts to support West African exports with initiatives such as the African Growth and Opportunity Act (AGOA)[18], the European Unions 'Everything but Arms" Initiative (EBA)[19], and China's robust efforts to increase its imports of primary commodities from Africa. Seck (2010) suggested that West Africa was not a prime destination for Foreign Direct Investment except in the extractive industry, namely Nigerian Oil, Ghanaian Gold, Nigerien Uranium, Senegalese Iron Ore, etc. (Seck, 2010).

The African Development Bank (AfDB) came up with facilities with the primary aim of targeting the global financial crisis. They were intended to counteract budget deficits, expand liquidity, and support financing for both infrastructure and trade. Some of those facilities were Emergency Liquidity Facility (ELF)[20] and Trade Finance

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[18] AGOA is a United States Trade Act enacted in 2008 to enhance market access to the US for Qualifying SSA countries.
[19] EBA is an agreement by the EU to grant less developed countries full duty free and quota-free access to the EU for all their exports with the exception of arms and armaments.
[20] The ELF aims to provide financial assistance to eligible countries to support a broad range of obligations, including fiscal stimulus and supporting public - private partnerships at risk

Initiative (TFI)[21]. These were deliberated by many experts to be critical to Africa's ultimate economic revival (Arieff et al., 2010; Obayelu, 2010). The AfDB made available $1.5billion Emergency Liquidity Facility, $1billion for Trade Finance Initiative, created a framework for quicker transfer of funds to suitable countries, and also policy advisory support. During the peak of the crisis between 2008 and 2009, AfDB loans rose to about $11bullion with most of its funds going towards budgetary support, trade finance and infrastructure projects to countries like Senegal where foreign investors had withdrawn (Arieff et al., 2010).

The IMF also provided funds to assist several countries that could not carry out their international repayment obligations and found it difficult to get credit or to raise funds from both national and international financial markets at reasonable conditions. The International Monetary Fund increased its financial assistance in response to the crisis by raising the amount that countries could borrow for low-income countries. The IMF's loaning commitments for Africa between January and July of 2009 was $2.7billion, compared to the $1.1billion commitments in 2008. However, the available funds from the IMF to African countries suddenly dropped due to the enactment of the Multilateral Debt Relief Initiative (MDRI) agreed upon at the G-8 summit in 2008. The overall volume of IMF credit accessible to African nations totalled about $4.7billion, but $2billion remained undrawn. Cote d'Ivoire had the largest loan program in West Africa ($581 million) (Arieff et al., 2010).

[21] The TFI provided $500million to support commercial banks and development institutions in Africa to use banking resources to support trade financing.

Ghana signed onto the Heavily Indebted Poor Countries (HIPC)[22] Initiative in the early 2000s with the aim of bringing its public debt rations to sustainable levels. The aim of the initiative was to allow the country to gain debt sustainability without debt relief and was consistent with fiscal policies towards debt sustainability. This helped Ghana in reducing its overall level of fiscal deficit from 9.81% of GDP in 2000 to 2.96% of GDP in 2005. Also, the stock of public debt dropped from 18.3% of GDP in 2000 to 26.2% of GDP in 2006 and rose again up to 55.2% in 2013 (Asiama et al., 2014).

A number of monetary policy measures were used to control the financial instability including reduction of interest rates, recapitalisation of financial institutions, revising budget expenses, bond financing of public spending, and targeted assistance on key sectors in Nigeria (Obayelu, 2010). An example of bond financing of public expenditure in Nigeria was the CBN issuing directives to banks that they had the option to restructure margin loans up to 2009, where rules on share buy-back were released with a limit of 15%. The targeted assistance plan was to support specific sectors considered as key growth drivers. The Nigerian government injected N70billion into the severely weakened textile industry in 2009. Prior to 2006, South Africa was the only sub-Saharan African country to issue a sovereign. However, in attempts to raise funds, several West African countries such as Cote d'Ivoire, Nigeria, Senegal and Ghana have successfully raised funds in international debt markets. Ghana in particular was able to place a $1Billion bond even before completing an IMF program. A few corporate entities in Nigeria and Ghana have also been able to issue Eurobonds successfully such as Guarantee Trust Bank of Nigeria issuing a five-year $500million

[22] HIPC is an initiative by the World Bank and the IMF to reduce debt burden of poor countries to sustainable levels in order to ensure that no country faces a debt that it cannot manage. (Lopes, et al., 2015)

bond offering in 2011 and Ghana Telecom selling a $300million five-year bond in 2007 (Amadou, 2015).

In order to respond to the several devaluations of national currencies, a range of actions were undertaken to protect the currency or to improve competitiveness. In the countries that operate a fixed-exchange rate regime, their governments depreciated their currencies to increase competitiveness. The Central Bank of Nigeria for instance, took aggressive measures to intervene in the foreign exchange markets so as to limit the fall of the Naira that went up just after the global financial crisis (Obayelu, 2010). The Nigerian Central Bank also depreciated the Naira in November of 2014 by 8.4% attempting to bolster the value of the Naira and maintain the foreign reserves. However, as pressure continued to mount on the foreign exchange rate, the Central Bank Nigeria closed up the official window in February 2015, which was viewed as a strategic depreciation of the Naira that resulted in relative stability in the currency market (Akakaiye, et al., 2016)

Steps were also taken to raise liquidity levels of banks as well as that of domestic firms' in order to forestall the impact of the crisis. In Benin, Burkina Faso, Cote d'Ivoire, Mali, Niger and Togo, the joint Central Bank (BCEAO[23]) provided funds on a seven-day basis to the regional money markets. Nigeria also reduced the cash reserve ratio and the liquidity ratio from 40% to 30% (Obayelu, 2010).

The region adopted other fiscal stimulus packages in order to control the severity of the crisis with contractionary fiscal policy. In Senegal, the government had to lower

[23] The Banque Centrale des Etats de l'Afrique de l'Ouest (BCEAO) is the Central Bank for West African states. It is the monetary Authority for Benin, Burkina Faso, Cote d'Ivoire, Mali, Niger, Senegal and Togo. This organisation is also responsible for issuing their currency.

its spending by 4% of GDP and its emergency spending by 0.6% of the GDP, while in Nigeria, the government utilised approximately $52billion of its foreign reserves to support the economy and to save economic activities from the recession though a stimulus package (Obayelu, 2010).

Generally, the fiscal policy measures adopted by West African countries sought to raisese the countries revenue and revert the progression of mounting national debt did not improve. The unchecked spread of lesser unofficial economic activities as a means of income and subsistence by a lot of households disturbs the instrument of proper taxation and causes a setback for fiscal policy actions. Therefore, countries are encouraged to seek for more funds in order to fill current account deficit gaps and to fill gaps between expenditures and revenues. Borrowing serves as an alternative for getting the required funds needed to meet government obligations, while safeguarding the development of socio-economic circumstances of their citizens (Lopes Da Veiga et al., 2015).

4.9 CONCLUSION

In this chapter we discussed the political economy of West Africa, regional economic integration as well as some political instabilities faced in the West African region. Furthermore, also discussed was the impact of financial instability on West African countries. The impact on these countries were evaluated under four channels – debt, stock market, trade and exchange rate. The region experienced a significant rise in debt levels in the aftermath of the global financial crisis. The stock market was the channel which experienced the biggest impact. The rate of returns on investment dwindled significantly, lead to capital flight by foreign investors. All the countries discussed also experienced a substantial dip in exports because of a fall in commodity prices, leading to a rise in budget deficits. This is because trade made up a large part of government revenues, so when trade activities decrease, the budget deficits increased. The financial crisis also resulted in a fall in nominal exchange rates. Since a lot of their revenue is from trade, a fall in commodity prices coupled with a fall in the nominal exchange rates mean that the economic activities suffered leading to a high rate of unemployment.

Additionally, the steps taken to resolve this financial instability was also discussed. Some of the steps taken included seeking financial assistance from the IMF, making use of monetary policy instruments such as interest rate reduction, devaluated currencies and bail out of some sectors. Other fiscal policy instruments were used such as revised government spending, and also increasing borrowing in order to fill up gaps caused by budget deficits. In the next chapter, the theoretical framework for the research is discussed.

CHAPTER FIVE

CONCEPTUAL AND THEORETICAL FRAMEWORK: BUSINESS CYCLE THEORIES

5.1 INTRODUCTION

This chapter explained the conceptual framework of the study and focused on the theoretical framework of this research. A theoretical framework introduces and describes the theory explaining why the research problems exist and is considered as the blueprint for the entire dissertation inquiry (Grant and Osanloo, 2014). It provides a lens through which this research topic was examined, making use of the Business Cycle theories as the theoretical foundation.

Economic fluctuations have negative consequences for the well-being of individuals and are therefore an important area of study because large fluctuations result in financial instabilities that can cripple the economy. Stages of a business cycle include the expansion phase which is the stage when the economy is growing characterised by rising GDP, lower inflation and a lower unemployment rate; the peak or boom phase is the phase where expansion is at its highest point before it transitions into the next phase; the contraction or recession phase is a stage where economic growth declines and GDP falls while inflation and unemployment starts to rise; and the trough or depression phase is when the economy reaches rock bottom after a long period of recession.

The stages can be so intense that they are referred to as the boom-bust cycle. A lot of scholarly debates have been focused on the periods of boom and recession, where the key area for debate has been whether recessions are naturally a consequence of a long period of boom. This was observed as one of the similarities in the various financial instabilities discussed in section 3.5.

The recent global crisis has once again left economists questioning economists' ability to explain business crisis mechanism and to provide policy solutions to economic crises (Dobrescu et al., 2012). The reason for this is two-fold. First, the recession cycle was of great intensity and caused significant economic fluctuations. The second reason is because of the challenges faced by macroeconomists where they failed to predict and explain the root cause of the crisis. We discuss three major theories – The Austrian Business cycle theory, the Marxian Analysis of the Business cycle and The Financial Instability Hypothesis.

5.2 THE AUSTRIAN BUSINESS CYCLE THEORY

This theory was initially introduced by Ludwig von Mises but was later enhanced and progressed by Friedrich von Hayek. The theory is not one of mathematical relationships but of historical explanations (Bismans and Mougeot, 2009). A prominent aspect of this Austrian Business Cycle Theory is the interpretation of the business cycle from a monetary aspect. The Austrian business cycle theorists emphasised the role that credit and interest rate plays in the movement of the business cycle. Interest rate is comprised of different levels of economic productivity such as price levels of different production phases and the marginal returns of expanding production processes (Keeler, 2001).

Austrian theorists differentiate between preference induced decrease in interest rate which reflects economic agents lowered time preference and policy included decrease in interest rate which occurs because of an expansion of credit by Central Bank. Interest rate reductions in interest rate should at the same time increase consumption expenditure and decrease savings and investment (Mulligan, 2006). Theorists also believe that equilibrium in the credit market consists of the balance between real savings and demand for investment loans, in addition to variations in money demand and supply (Keeler, 2001).

A prominent feature of this theory is artificial expansion, also referred to as policy induced expansion. In a monetary economy, an artificial expansion or boom occurs when there are credit extensions and also when there is a reduction in interest rates resulting from bank interventions, while a crisis and subsequent stages of depression are a combination of phases of unjustified investment, resulting from credit expansions. On the other hand, equilibrium in a non-monetary economy is attained when the natural rate[24] is equal to the market rate[25]. Furthermore, an artificial expansion occurs in a non-monetary economy when an excess money supply causes the market rate to be lower than the natural rate. In this period, an additional money supply causes savings to decrease and investment to increase. Investments that would not normally be considered if interest rates were not influenced would be embarked upon resulting in fewer savings and more consumption (Bismans and Mougeot, 2009).

[24] The natural rate is the interest rate that results in growth of real GDP and stable inflation rate.
[25] The market rate is the natural rate determined by the flows of planned saving and investment.

The Austrian theorists postulate that whenever there is a growth in credit beyond available resources of an economy, there will be two outcomes. The first outcome is the Cantillon effect. This refers to a situation whereby fluctuations in money supply cause fluctuations in relative prices. The fluctuation in prices happen because fluctuations in money supply has entry points in the economy. For instance, the first beneficiary of a new money supply has the opportunity of spending that extra money prior to an increase in prices, whereas the last beneficiary obtains his portion of the new money supply after prices must have increased. Therefore, the advantages and difficulties of inflationary credit expansion are not evenly spread in an economy (Zelmanovitz, 2011).

The second outcome is that the presence of new money decreases the real interest rate causing investments to increase because cost of capital is low. Hence, there is a rise in capital intensive production creating an increase in demand of real resources above the existing actual resources in the economy. During an expansion, the economy experiences periods of excessive consumption and excessive investment where economic agents are guided by “distorted relative prices” (which is a result of how new money is introduced into the economy along with misguided investments). After some time, economic agents start to compete for actual available resources with respect to consumption and investment, marking the end of the expansion and demonstrating where business cycle peaks. Thus, as economic agents try to access more capital for investment purposes, savings begin to depreciate, creating a mismatch between savings and investment (Zelmanovitz, 2011).

The Austrian business cycle posits that artificial low interest rates governs an unmaintainable boom where resources are channelled towards early stages of production, resulting in a lot of unfinished production projects. Besides, a lower interest rate means that consumption would increase. Since consumable products take a while to be produced, consumers are not prepared to wait for their wants to be met. This system is not maintainable, and the outcome is the abandonment of many entrepreneurial plans resulting in high unemployment. Furthermore, since production projects are initiated and cannot be completed, this will after some time lead to a scarcity of resources, hence ending the artificial boom, leading into a recession. According to this theory, recovery will not happen until the bad investments are ended or stopped and the resources reallocated according to the actual intertemporal preferences of consumers (Dobrescu et al., 2012).

The lowering of the interest rates below sustainable market rates increases production of consumable products and investment within a short period of time but both factors are reduced in the long run. Credit increases causes aggregate output, aggregate consumption and investment, however, long run reduction in the level of economic growth, consumption and investments, manifests as a recession (Mulligan, 2006). Similarly, a very low interest rate would suggest that consumers multiply their consumption and reduce savings. This results in an economic situation whereby the consumable outputs take a long time to be produced because consumers are not patient enough to wait for their desires to be satisfied, and hence the production arrangement is not sustainable. Both producers and customers entrepreneurial plans are affected because they were grounded on a lower interest rate and a longer production arrangement (Dobrescu et al., 2012).

According to this theory, financial intermediaries play an important role in the allocation of resources in a monetary economy, and in an attempt to carry out their responsibilities and commitments, financial agents such as banks bid for money. As banks bid for money, the interest rate rises (Zelmanovitz, 2011). Similarly, when interest rates rise, higher rates of returns in production are needed to compete with financial instruments such as government bonds with higher returns (Mulligan, 2006). The rising interest rate and limited credit availability stops certain investments, creating a new business environment where defaults increase, and uncertainty rises suddenly. This is the moment when recession starts. Moreover, as uncertainty increases, so does the demand for cash balances (Zelmanovitz, 2011).

Mulligan (2006) identified three ways by which a recession can happen according to the Austrian Business cycle theory. Firstly, it can be through deflation. After a long period of supplying new money, Central Banks realise the negative effects that the low interest rate has caused, and therefore, try to control the damage by reducing the money supply using contractionary monetary policy. This is done by raising the interest rate and occurs towards the final phase of the expansion, which is also when a recession phase is on the horizon. However, because of policy lag, recession still occurs, and the negative effect is intense. Nevertheless, the policy eventually takes effect and the economy returns to pre-recession conditions with sustainable interest rate. For example, contractionary monetary policy was noted to have preceded the Great Depression.

Secondly, it can be through Steady Inflation. During an expansion, Central Banks steadily increase money supply over time, especially if they are not cognisant of the effects of their policy induced credit expansion. The low rates of interest encourage investors to invest in production activities that are low yielding. The ripple effect of this high rate of investment is that savings decrease, and consumption rises. Therefore, the inefficient allocation of resources would cause steady rise in prices and drive interest rate upwards, resulting in large numbers of unfinished projects/production and hence, causing unemployment to rise. Most post-war recessions began in this manner, with an example of the first Gulf crisis recession of 1990-91 (Mulligan, 2006).

Thirdly, it can be through accelerated inflation. Sometimes Central Banks may anticipate a recession or a rise in credit demand, so they try to control the situation by expanding credit even quicker. The recession will be delayed if the expanded credit is able to sustain both consumption and investment demands. Unemployment rates and GDP may seem like the economy is in a good condition during the policy induced expansion, but the policy results in an unmaintainable production situation. Middle and late stage production endeavours are stifled as there are not enough resources to meet large demands for consumable goods (as they have been allocated to early stage productions), hence, the weakness in the middle stage hinders the productivity in the economy as investment plans cannot be achieved. Therefore, a lot of resources are not utilised properly because of the accelerating inflation. Even though this process is meant to suspend or delay the recession phase from occurring, it ends up unfolding a serious and prolonged one (Mulligan, 2006).

In a nutshell, an induced credit expansion is mostly justified by the need to raise investments and general economic activities. However, an economic downturn would be unavoidable. This is because the induced investments cannot be sustained, and consumers cannot wait long periods to satisfy their wants. Also, the production structure cannot translate outputs associated with early-stage production into the same amount of output that would have been gotten if production got to the late stage (Dobrescu et al., 2012).

5.3 MARXIAN ANALYSIS OF THE BUSINESS CYCLE

Karl Marx was one of the first economists to identify the presence of business cycles (Evans, 2004). He analysed business cycles from the viewpoint of financial instability, suggesting that movements of the business cycle occur as a result of the interaction of productive capital and financial capital (Argitis et al., 2014). Even though Karl Marx did not explicitly present a comprehensive business cycle theory, he presented several rationalisations in different areas of his work.

A fundamental element of this business cycle discussion is the deviation from the way in which recession is viewed. A lot of scholars' view recession as a distress or an economic upset but from Marx's perspective, it is necessary for economic growth in a capitalist economy. This is because of the opinion that an expansion is a result of lengthy economic strains, whereas, recession or downturn is the means by which those strains are eradicated, forming a new era of economic growth (Evans, 2004).

As stated earlier, Karl Marx had several rationalisations for the business cycle. One of the rationalisations is the simple commodity economy context. The production or commodity economy is seen as a monetary economy, because products are traded for money, and the exchanged money is not instantly used to buy another product. Hence, that exchanged money is withdrawn from circulation and serves as a store of value. This is known as the abstract possibility of crisis (Evans, 2004).

Also, in some cases, products are not instantly exchanged for money, but for a contractual promise to pay at a future time. This involves money's function as a means for deferred payment. However, because of the money's function as a means of deferred payments, there are two likely outcomes. Firstly, if there is inflation before the agreed date of payment, the borrower may not be able to raise the sum needed to pay back his debt. Secondly, if the debt is associated with other series of debts, the inability of a borrower to pay could affect the ability of others to pay (Evans, 2004). This is another form of abstract possibility of crisis and represents the notion that problems in one part of the economy could quickly spread to other parts.

Another business cycle explanation relates to the credit system, which plays an important role in Marx's analysis as it is one of the reasons why economies grow during an expansion or fail during a recession (Evans, 2004). The accessibility of credit as well as interest rate is the linkage between business capital and the financial system. For instance, firms can decide to lend their capital to other capitalists as a way of making profit. The other capitalists then repay the money along with a share of revenue, also known as interest. Marx labelled this type of capital as interest bearing capital, and also explained that there are two types of interest rates; market rate and average rate[26] (Evans, 2004).

According to Marx, at the beginning of an expansion, investors regain confidence, and this comes with a set inclination to expand commercial credit supply. With expansion of credit supply (a rise in investment), there is less demand for money as a payment means, causing the market interest rate to decrease or stay as low as possible. As expansion advances and production is ongoing, the demand for money as a payment means has a tendency to increase, mounting pressure on the market interest rate. However, in a moment of crisis, the commercial credit crumbles and there is a frantic demand for money as a payment means, causing market interest rate to climb to its peak level. During the ensuing recession, market interest rate tends to reduce as the immense pressure calms down. Consequently, an unwillingness to expand commercial credit may perhaps cause demand for money as a payment means to increase further, in so doing stopping the rate from dropping as low as it was in the beginning of the expansion (Evans 2004).

Furthermore, according to Marx, phases of economic growth and accumulation of wealth will in general undermine that state of their own prosperity and lead to a decrease in productivity. This is because of the parts that financial systems play when they over expand credit during periods of expansion or upturn. In the last stages of the upturn where speculations about the returns on natural resources and financial assets are declining, and the upturn is ended by a financial crisis and a steep economic

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[26] The average rate is the average interest rate of an entire business cycle, reflecting how the market interest rates fluctuated in that period.

downturn. Therefore, with rising unemployment and liquidation of weak firms, the downturn makes the conditions through which a new era of productivity and economic recovery can be established (Argitis et al., 2014).

Marx acknowledged two likely reasons that can end an expansion and bring about a crisis. The first reason comprises of a semi-autonomous monetary-financial crisis, which occurs when banks decide to restrict credit after an elongated period of credit expansion. Credit expansion can be restricted because banks anticipate imminent problems regarding their liquidity or ability to give loans to investors. Therefore, as investors and businesses struggle to gain access to credit, this leads to a significant rise in interest rate that causes a sharp decline in profit returns in the business sector. The second reason relates to rising labour costs and raw materials on one hand, and increasing interest rate on the other hand, that results in a fall in the net profit returns of firms. If firms are not able to carry out their payment obligations while the credit system is by now over-expanded, the economy ends up in a crisis (Argitis et al., 2014).

This is because the imminent demand for money to meet their obligations pushes interest rates higher and the interest payment can surpass overall profits of some firms. Therefore, people lose their jobs and unemployment rises; furthermore, investment plans are deserted, and there is an upsurge of bankruptcies. On the other hand, an increase in interest rate in the financial sector is usually followed by a decline in prices of securities. This situation affects brokers who traded at top prices on credit which cannot be recovered. In all cases, the incapacity of the business sector and financial sector to pay back loans is linked to a banking system crisis, and hence, an economic recession (Argitis et al., 2014).

5.4 MINSKY'S FINANCIAL INSTABILITY HYPOTHESIS (FIH)

The Financial Instability Hypothesis is an endogenous business cycle theory that analyses the financial framework of a country. It focuses on investments by firms and how they make financial choices (Caverzasi, 2010). Minsky's financial instability hypothesis posits that capitalist economies tend towards financial instability (Palley, 2009).

The Financial Instability Hypothesis seeks to explain how finance drives the boom-bust cycle. The boom is driven by an overestimated return on investment which results in a higher level of investors' confidence, causing investors to seek credit to finance their projects (Barnes, 2011). As a result of the increased inclination to borrow, a large portion of projected profits are used for repaying financial commitments. Minsky believed that a high rate of investment brings about a high rate of profit in the economy (Wray, 2011). However, investors soon realise that returns are overestimated and then panic occurs initiating a bust. During the initial boom, prices of shares and firms' valuations are higher than the real values, but because share prices are high and expected returns are high, financial institutions boom. However, at the latter stage, prices fall quickly below the real values (Barnes, 2011). Therefore, the financial instability hypothesis was formulated to expound instabilities that happen in a capitalist economy (Tse, 2001).

According to Minsky, phases of the business cycle are influenced by firms' investment financed by loans and purchasing capital asset. He recognised that loans by individuals and government are important but does however believe that they only adjust to economic situations, and rarely cause changes in the business cycle. The reason why firms' borrowing has more viability with regards to business cycle is that as firms borrow to carry out investment projects or to purchase capital assets, their ability to repay their loans or financial obligations is a key-determining factor for economic stability. In other words, the business cycle governs future productivity and profit level of firms and how they repay their financial obligations (Evans, 2004).

Minsky identified three categories of firms' competence to sustain and repay their financial obligations: hedge finance, speculative finance and Ponzi finance. Palley (2011) refers to this as the basic Minsky cycle. Hedge finance refers to a situation whereby a firm expects its overall profit to be more than its financial obligations throughout the repayment period. Speculative finance refers to a situation where a firm expects its overall profit to be more than its loan payment obligations, but in the meantime, profit is enough for the payment of interest on the loan but not enough for its cover it until maturity. This firm uses short term loans to fund long term assets. This means that the firm can pay back some of their debts, and because they repay their interest obligation, their overall borrowing will not rise. Lastly, Ponzi finance is similar to speculative finance, but the short-term overall profit is not enough to repay interest and so the firm has to get more loans to be able to pay the remaining interest. In Minsky's opinion, the economy will be stable if there is more hedge financing (Evans, 2004).

The Financial Instability Hypothesis asserts that at some point during an expansion, the financial institutions of a vibrant capitalist economy endogenously change from buoyancy to a state of unsustainability. Minsky observed that during an expansion, profit-oriented businesses have reasons to seek financing compared to equity, hence, stability is destabilising (Tse, 2001).

If there are a lot of institutions that are financially unstable, the economy becomes prone to a debt deflation. Therefore, in order to curb the instability of a capitalist economy, Minsky suggested that it is important for the government to form appropriate regulatory institutions to control the economy. He suggested two key institutions – the Big Government and the Big Bank. Prior to World War II, the United States of America's government was small (with respect to GDP) and could not sustain the economy. Also, debt deflation can be thwarted if the government can counter the rise and fall in investment (Tse, 2001).

However, a big government deficit is likely to have three effects. The first related to income and employment effect. When there is a deficit in government, the gross national product (GNP) rises through the multiplier, resulting in a rise in income flow and employment. The second effect relates to cash flow. A government deficit sustains cash flow, so individuals can sustain debts. For instance, in some capitalist economies, when individuals lose their employment in a recession, they get unemployment benefits. The third effect relates to the portfolio effect. This is a situation whereby a government increases money supply during a government deficit, leading to excess reserves. Government then sells more of their bonds to curtail the excess reserves, and hence, the private sector will possess a lot of government bonds. As government securities are the securest type of asset, the private sector gains more confidence. In other words, government deficit determines the highest and lowest levels of unemployment, income, and flows of profit (Tse, 2001).

The financial instability hypothesis argues that if a large corporation or a bank within an economy is unable to repay its debts during a recession, other corporations and banks will be affected negatively because of the interconnectivity and linkages of their balance sheets. Therefore, another regulatory authority might be necessary to avert debt deflation. Central Banks for that reason step in as the lender of last resort, giving credit to financial institutions, and by doing so, the financial sector is protected from situations whereby they are not able to repay their financial obligations. Subsequently, if financial institutions are aware that the Central Bank can bail them out as the lender of last resort in situations where they cannot meet their financial obligations, they will be care free about business dealings, and risky conduct is encouraged. Therefore, Central Banks have a responsibility to manage commercial banks' activities so as to minimise the amount of bad loans approved (Tse, 2001).

In other words, the optimism of expansion causes firms to be over-indebted, and thus, the boom becomes a financial crisis resulting in a debt deflation, and then a recession or even a trough. Financial crises are persistent but always different as capitalism continually changes. From a Minskyan stance, the severity of the recent global financial crisis was controlled by monetary and fiscal policy interventions. Also, financial fragility occurs in the financial market when there are no reforms regulating dishonest practices by financial institutions which can result in a severe financial crisis (De Antoni, 2016). Firms that build up debt without raising their revenues are more likely to become Ponzi at the smallest rise in the interest rate; an idea that was central in explaining the recent global recession from a Minsky viewpoint (Solomon and Golo, 2013).

The Financial Instability Hypothesis also alludes to a super Minsky cycle that occurs over a few business cycles. The super cycle is a course that changes financial market regulations, firms' decision-making practices, and Central Banks regulations. The process of institutional change usually takes a few business cycles where optimistic investments during expansions morphs into recession. On the other hand, the economy experiences a crisis when the super cycle has seriously affected and weakened its institutions. However, in between super cycles, an economy undergoes several boom-bust cycles (Palley, 2009).

Another Minskyan perspective is that a long period of expansion creates opportunities for both banks and businesses, thereby increasing investors' confidence, the safety margin tightens, and speculative and Ponzi finance becomes the norm. However, an unexpected rise in interest rate resulting from contractionary monetary policy, external shock or change in future expectations creates a situation whereby speculative and Ponzi units are unable to carry out their financial obligations. Therefore, they will either put their assets on sale or default. This action results in a crisis and debt deflation that escalates because of the interconnectivity of balance sheets among financial institutions (Caverzasi, 2014).

In summary, we observe that the Financial Instability Hypothesis assumes the economy is naturally unstable, and that government interference is necessary to stabilise it. The process of stabilising the economy requires policy implementation, and successful policies lead to boom or expansion. Businesses gain confidence and are enthusiastic about the possible future return on profit, but this does lead to increasing risky conducts and economic instability occurs. Minsky's interpretation is that the government intervention sways the economy towards instability, an opinion that differs from the classical economic understanding that the economy is naturally stable, and the invisible hand frequently pushes the economy in the direction of equilibrium (Tse, 2001).

Table 5.1: **<u>Summary of Business Cycle Theories discussed</u>**

Austrian Business Cycle Theory	*Marx Analysis of the Business Cycle*	*Financial Instability Hypothesis*
This theory is an explanation of the business cycle from a monetary viewpoint. It highlights the importance of interest rate and credit in the progression of the business cycle. An underlying belief of this theory is that credit market stability depends on the balance between real savings and demand of credit for investment purposes, and also the fluctuations in the demand and supply of money (Keeler, 2001). A constant feature of the Austrian business cycle theory is	Karl Marx explained the business cycle from a financial instability angle. He opined that business cycle changes occur because of the interactions of productive capital and financial capital (Argitis et al., 2014). It is also imperative to note that he saw a production economy as a monetary economy. This is because products are exchanged for money (as a store of value) or for a promise to pay at a	The financial instability hypothesis examines the financial structure of an economy. It suggests that capitalist societies veer towards financial crisis (Palley, 2009). It aims to describe how finance drives the business cycle from boom to bust or from expansion to recession, because business cycle phases are manipulated by investment decisions by

the concept of artificial boom. This is also known as policy-induced expansion, which happens when there is a decrease in interest rate so as to increase the money supply, resulting in extensions of loan repayments. Whereas periods of crisis and following periods of depression are a result of accumulated unjustified investment that happened in various parts of a credit expansion (Bismans and Mougeot). According to this theory, a reduction in interest rate raises the money supply, making the cost of capital to be low, and this encourages investment. Therefore, there is an upsurge in capital-intensive investments causing the demand of real resources to rise exceeding the actual present economic	later date (deferred payments). In Marx's analysis, investors have confidence during the early stages of an expansion and so want loans in order to increase their credit supply for investment purposes. This rise in investment reduces the need to hold money as a payment means. Therefore, interest rate falls or remains low. As the expansion progresses, so does the demand for money as a payment means, intensifying pressure on market interest rate. However, when there is a crisis, investment credit ceases and there is a desperate desire for money as payment means, making interest rate soar to their	firms with regards to how much loan they can get and how much capital asset is purchased. During an expansion, expected returns increases, encouraging firms to increase their investment, and encourages financial institutions to give credit. Because of the focus on making more profit, both firms and financial institutions are not alert to rising debt. The debt eventually becomes higher than profits and capital stock, and thus, a large part of the profit is used for repayment of debt, even though the interest rate has not changed (Evans, 2004).

resources. As investors seek to gain more access to investment capital, savings declines and there is a mismatch between investment and savings. This is a sign of the end of the expansion. Moreover, financial intermediaries perform an important role of allocating resources, and as they attempt to do their activities and financial obligations, banks bid for money. As banks bid for money, interest rates rise making it impossible to carry out capital-intensive projects, as there is inadequate credit availability. This produces a different business environment where there are increases in defaults and uncertainty. Increases in uncertainty level also causes the demand for cash balances to raise as well, which signals the	highest level. In subsequent recession, the market interest rate falls because the desperate need for money as a payment means calms (Evans, 2004). Karl Marx unlike other scholars viewed recession as a necessary step for economic growth in a capitalist society. Marx also recognised two possible explanations on why a boom period end. The first relates to a situation when banks resolve to control credit after a long expansion period because they envisage impending complications regarding their ability to provide loans to investors. Thus, as investors strive to get loans, it results in a	The Minsky's business cycle identifies the progression of how the financing of investments by firms and financial institutions can lead to financial instability, moving the economy from expansion to recession. This starts in an expansion with hedge finance where firms borrow for financing investment with the expectations that revenue will be enough to pay back both interest and principal. After a while, it turns into speculative finance where revenue can only cover interest payment and is not enough for the principal. The last part of the sequence is Ponzi finance where revenue is not

beginning of a recession (Zelmanovitz, 2011).	substantial rise in interest rate. The rise in rate of interest triggers a swift fall in the levels of profit return. The second explanation comprises of rising costs of factors of production such as labour and raw materials and rising interest rate. Therefore, if businesses are unable to perform their payment obligations during an expansion, a crisis is imminent (Argitis et al., 2004).	sufficient to cover both payments of interest and principal, so firms rely on capital gains to carry out payment obligations (Palley 2009).

5.5 LIMITATIONS OF THE BUSINESS CYCLE THEORIES

i. *Limitations of the Austrian Business Cycle*: A major assumption of the Austrian Business cycle is the artificial boom where there is an induced decrease in interest rate so as to increase money supply. Since the artificial boom is not backed by real savings, investment suffers eventually, and the boom turns into a recession. This is because according to Mises, entrepreneurs are unable to estimate in advance the impacts of money supply expansion on prices because they cannot anticipate the extent to which the demand for money for transactionary purposes would change. However, this principle was disputed by scholars such as Jorg Hulsmann and Paul Krugman who argued that there is an unacknowledged or overlooked scenario where investors are able to accurately predict the impact of money supply increase on prices and the induced decrease in interest rate. When that happens, a recession would not ensue because entrepreneurs would demand higher interest rates, that is, they would ask for higher price premiums on the gross market interest rate, raising the interest rate back to its normal (pre-induced) market level (Macovei, 2015; Howden, 2010).

A critical aspect of the business cycle according to this theory is the equilibrium of the structure of production. It is assumed that the level investment is directly influenced by the consumers' willingness to reduce present consumption expenditure, and so consumers put their savings into time-deposits (withdrawal of savings from time-deposits requires some notice period or else, they will incur losses). However, it can be argued that, even if that is the case, there is no guarantee that the notice period of time-deposits correctly coincides with producers' investment period. Also, even if consumers put their savings into time-deposits, the losses suffered from potential withdrawals would have to be substantial enough to dissuade consumers from taking out money. Therefore, it is doubtful that consumers would be enthusiastic about putting their savings into time-deposits except banks offered interest rates large enough to counter the cost of withdrawals. Consequently, for consumers to be eager to put their money into time-deposits, banks have to propose a term premium but that will raise their interest rates causing them to demand for even higher premiums on loans. Therefore, the suggested transmission mechanism by the Austrians for distributing savings to investors is not that straightforward (Mentrah, 2014).

Another important aspect of the Austrian Business Cycle theory is the argument that recessions are important because they correct all the malinvestments completed during the artificial expansion. However, as shown in this study based on the several financial crises discussed (see section 3.5), governments and central banks would make efforts to stimulate the economy during recessions by a further increase in money supply. This is done by the government and/or central banks as an attempt to maintain employment levels by keeping firms that are not doing well afloat, but it ends up prolonging and enhancing the adverse consequences of their initial credit expansions. Consequently, the problems in the economy during a recession are greater in magnitude because of the artificial boom and sustained by the stimulus (Bjonskov, 2011). The Austrians, on the other hand, would argue that unprofitable firms should be allowed to fail because it allows profitable firms with access to surplus capital to acquire valuable assets, which would generate new sustainable businesses and employment.

ii. *Limitations of Marx Analysis of Business Cycle*: As mentioned earlier, Karl Marx did not cohesively put together a comprehensive business cycle theory, he presented several rationalisations in several of writings. As a result, every debate about Marx's explanation of the business cycle entails a contest between explanation, understanding and contextualisation (Clarke, 1994). Marx explained how the demand for money as a medium of exchange leads to economic boom or bust (see section 5.3). However, the financial system detailed by Marx in a capitalist economy is not as complex as the modern financial institutions and there are other factors that impact interest rate levels.

For instance, contemporary financial structure is a response to recessions in the U.S between during the 1960s and 70s. Investors have found new ways generate capital at the expense of workers, keeping interest rates low (Tabb 2010). Furthermore, there are other financial instruments available to financial that are liquefiable and can be used for generating money for investment, without affecting the ability of household to withdraw deposits. For example, deindustrialisation in the U.S during the 70s was accompanied by leveraged buyouts in the 80s where failed enterprises were purchased using the target enterprises' collaterised assets. This practice seemed to continue until the collapse subprime mortgages.

Clarke (1994) on the other hand argued that the failure of Marxists to come up with a satisfactory theory of business cycle especially in response to the deindustrialisation of the 70s does not imply that the crisis tendencies described are irrelevant. It could be that capitalism is not inherently prone to crisis but that the dislodgment of the capitalist system was an outcome of institutional and political let-downs. The uniqueness of the Marxist viewpoint is that it explains causes of boom-bust cycle not in natural or abstract economic parameters but as a social relationship within the capitalist mode of production and offers resolution for economic crisis through the transformation of those relationships within an economy.

Another criticism of Marx's business cycle explanation is that it seems to have a functionalist approach as it only explains the efficient functionality of financial institutions in a capitalist society but does not consider the persistent poverty present in a capitalist economy. In spite of this, it has been argued that the functionalist approach downplays Marx's refutation of monetary business cycles. According to

Toporowski (2013), Marx shed light on how investor's need to finance production led to the rise of interest-bearing capital. The author argued that Marx's explanation of the business cycle is only functionalist because of the fact that financial markets are founded to meet the credit demands of capitalist production. However, since industrial capitalism existed before the emergence of financial markets, credit does exist solely for the purpose of serving industrial capitalism.

Financial markets emerged initially because of the need for commercial credit and later transformed into the overall credit system in order to encourage and sustain industrial production without having to hold large stocks of money capital, thereby raising the profit rate of capitalists by decreasing the stock of money capital they had to loan (Potts, 2011). The central focus of Marx's discussion is that since financial markets exist to serve industrial capitalism, it has become a significant liquid source of financial gain. Interest-bearing capital as well as credit-inflation turned out to be the medium through which capitalism was redirected on the reshaping of balance-sheet to be source of capital instead of just production.

iii. *Limitations of Financial Instability Hypothesis*: The financial instability hypothesis explains a financially driven boom-bust economic cycle (see 5.4). However, several aspects of financial instability hypothesis have been criticised. For instance, the cause or the boom phase is not explained, even though he detailed how the boom period transitions into the bust. According to Prychitco (2010), the theory also does not acknowledge how increase in money supply and alterations in interest rate leads to optimism and consequently boom phase and optimism in the first place. Therefore, to that author, the theory places more on socio-psychological behaviours of entrepreneurs instead of economic patterns. However, optimism can be better explained using the Austrian theory which insinuates that while widespread optimism lead to unpredictable situations, it is a product of general macroeconomic boom, but not the source. But the Financial Instability theory do not imply a systematic tendency in one direction. It needs to explain why mistakes are not randomly distributed around an unbiased mean since it is expected that systematic mistakes trigger correction mechanisms.

Another criticism of Financial Instability Hypothesis is that market mechanism does not result in a financial crisis, but crisis occurs as a result of decisions made by banks and the activities of businesses in an attempt to organise their firm's finances in expectancy of banks' demands and policies. This suggests that accounting information does not play a part in Minsky's theory. To Barnes (2009), both accounting information and investor's decisions play important roles. Since it is assumed that the interest of business owners and those that manage it are the same, he did not acknowledge the impact and consequences of information asymmetry when businessowners try to influence and mislead investors and banks.

Financial intermediaries are also able to influence investors' decision making based on the investors' anticipated return on investments when selling financial packages, especially when their anticipations are high and unachievable. Therefore, it is argued that good accounting practice essentially has an exaggerating effect at various points of the business cycle. For example, during the financial crisis of 2007, banks and other financial intermediaries were directed to lower book values of assets to a reasonable value, even with instances where payments have been made. Since subprime securities were no longer sold or purchased, firms holding those securities as assets were instructed to reduce the value in some way; the reduction could be similar to other weakened assets or by a substantial amount (Barnes, 2009).

5.6 CONCEPTUAL FRAMEWORK

Conceptual framework refers to a researcher's synthesis of literature on how to explain a subject matter. It captures the researcher's understanding of how the variables studied connects as a whole. In chapter two, Classical and Keynesian economic thoughts on public debt and economic growth was reviewed (see section 2.2). In that chapter, several debates on public debt and its impacts economic growth were discussed. The channels through which public debt affects the economy was also discussed – resources available to the financial market and interest rates were identified (see section 2.3). Furthermore, in chapter three, financial instability was defined and sources of financial instabilities as well as the influence of macroeconomic policies (fiscal and monetary policy) in combating financial instability were reviewed (see 3.2, 3.3, 3.4). Evidence of this public debt channels, financial instability sources and the role of macroeconomic policies were demonstrated in the major financial instability channels discussed (see section 3.5).

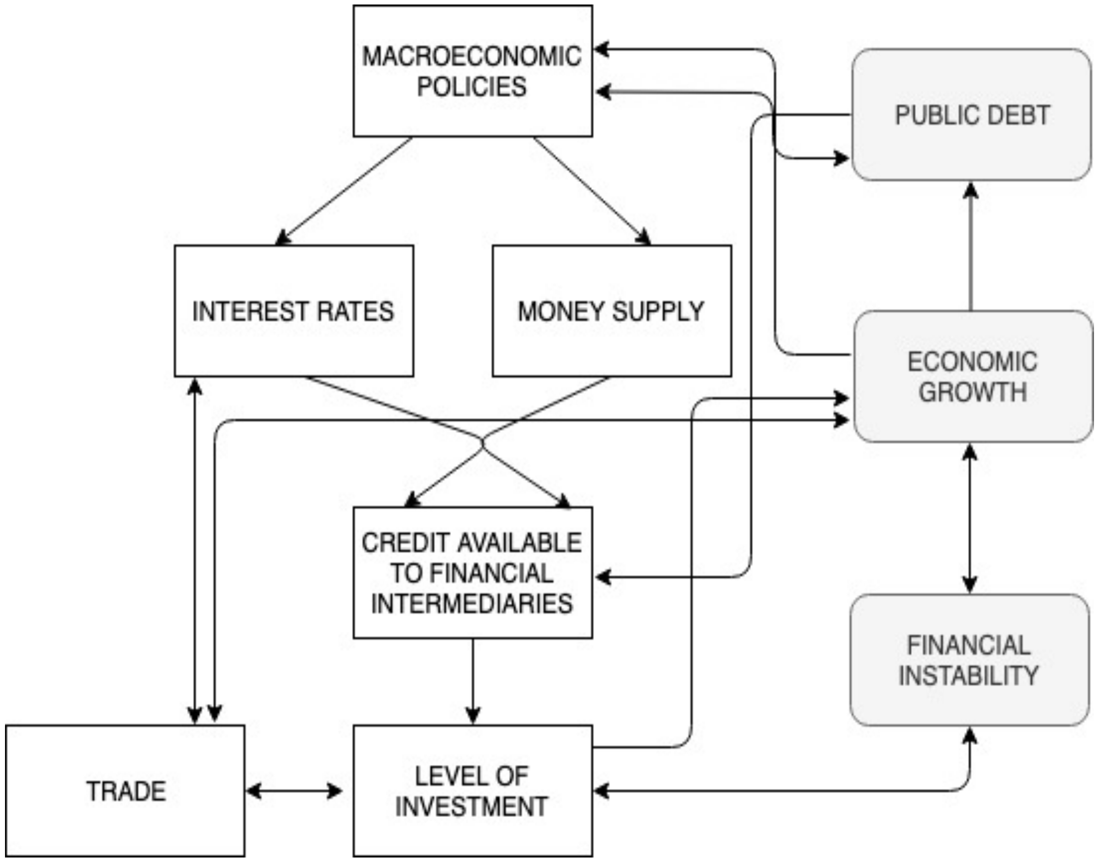
The contextual information chapter (chapter 4) discussed the regional integration of the selected West African countries (ECOWAS) and its approach to trade; as well as the impact of financial instabilities on West African countries where channels through which the recent global financial crisis affected the region was elaborated – debt levels, stock markets and trade (see 4.5, 4.7). In this chapter (chapter 5), theories of business cycles were discussed, and it was deduced from those theories that the key macroeconomic variables that influences fluctuations in the business cycle are interest rates, credit available to financial intermediaries and level of investment (see sections 5.2, 5.3, 5.4).

Based on these literature review chapters; the study develops a conceptual framework (figure 5.1) which illustrates how public debt and financial instability affects economic growth. It begins with macroeconomic policies by the government and/or central bank to sustain economic growth through the adoption of fiscal policies (government spending, public debt, budget deficit, etc) and/or monetary policies (bank reserve requirements, open market operations, inflation targeting, etc). The policy(s) adopted would have an impact on interest rates and money supply. The level of interest rates and money supply could be positive or negative for the economy depending on the reaction of financial intermediaries. If the interest rates are high, it affects the liquidity of financial intermediaries and their ability to give loans to investors. High rates of interest, coupled with low money supply as well as shortage of credit over a period of time causes investors to doubt the credit worthiness of financial institutions, investment levels falls and triggers crowding out, leading to financial instability and consequently affecting economic growth negatively (see 3.3,3.4). The opposite is the case when interest rates are low and money supply is high.

Furthermore, public debt is a macroeconomic policy instrument and it is usually used to foster economic growth. In a recession, it is usually adopted to correct budget deficits or as a source of revenue for government spending, which impacts money supply (see 2.2.1, 2.2.3). However, high public debts affect the credit available to financial intermediaries through banks' balance sheets because of the volume of government securities they hold. If government securities are used as collaterals for debt, it means that banks lose their assets, affecting the credit worthiness and liquidity of banks as well as their ability to give credit to investors. Likewise, high public debt and rising interest rates weakens foreign investment, which makes it hard to finance the debt affecting a country's current account. High public debts and rising interest rates also causes decline investment levels and hinders economic growth (see 2.3). This situation prompts a panic and investors lose confidence in the capability of financial intermediaries to perform their role, resulting in crowding out of investment. The crowding out of investment triggers financial instability and adversely affects economic growth.

On the other hand, if a country has weak monetary policies, interest rates might be raised in order to protect the exchangeability of their currency. But strong currencies stimulate imports and makes exports expensive, widening trade deficits. Since imports and exports are directly connected to GDP, an unjustified strong currency can put a strain on the economy in the long run because domestic firms become uncompetitive, reducing investment levels and growth rate. As aforementioned, raising interest rate can be detrimental especially when the foreign investors assume that the rates cannot be sustained, creating lack of confidence and panic (see 3.3, 3.5,4.7).

Figure 5.1: Conceptual Framework of the Study



Source: Author's compilation (2018)

It is important to mention that there are some limitations to the study's conceptual framework. This is because they are based on the following assumptions: - firstly, the framework shows interest rates and money supply as the channels through which macroeconomic policies affect the real economy. Secondly, that the credit available to financial intermediaries and investment levels are responsible for the presence or absence of financial instability. Thirdly, the framework does not consider effects of household activities on economic growth.

Although certain variables or factors contributing to public debt, financial instability and economic growth may seem to be omitted (such as purchasing power of the citizens, labour productivity, governments' attitude towards reforms, etc), similar studies have been able to achieve their study objectives without the omitted variables. For example, Creel et. al. (2014) used non-performing loans, stock market volatility, return on assets, trade openness and inflation to investigate whether financial stability has causal impact on economic performance; Prochniak and Wasiak (2017) investigated the impact of the financial system on economic growth using variables such as domestic credit provided by financial sector, bank non-performing loans, monetization ratio and growth rate of real GDP per capita; Baum et. al. (2013) used growth rate of GDP, gross fixed capital formation (% of GDP) interest rate and trade openness to investigate the relationship between public debt and economic growth. Therefore, it suggests that while the assumed omitted variables might have been adopted in other studies or might have a significant influence in other countries, including them in this research is outside the scope of the study (see 6.7) and could make it difficult to achieve the study objectives.

Furthermore, the variables in the framework are adopted from the business cycle theories (see 5.2, 5.3, 5.4), including ones with the most impact on public debt and financial instability of the selected West African countries (see 4.7). As mentioned in contextual information chapter (chapter 4), the case study countries are highly indebted because that is how government spending is funded, and a major contributor to GDP is trade. Thus, while testing the business cycle theories in the selected West African countries, it is important to include the variables that has significant impact on their economic growth. Therefore, it can be asserted that even with of the specified limitations, the conceptual framework still contributes an adequate approach to answer the research questions and achieve the study objectives based on relevant literatures reviewed and the theoretical framework adopted.

5.7 CONCLUSION

The theoretical framework of this research was discussed in this chapter. Three theories of the business cycle were examined. It can be deduced from these theories that the key macroeconomic variables playing an important role in the movement of the business cycle include the rate of interest, money supply, availability of credit to the financial market and investment, which form part of the model used in this study. The level of interest rate affects the amount of money in circulation. The amount of money in circulation plays an important role in investment decisions by both firms and banks. If there is a shortage of money supply, it means that the credit available to domestic firms would be limited. The reverse is the case when there is an increase in the money supply.

In a situation where there is increased money supply over a long period of time, investors' confidence in the financial market increases and which tends to raise the general level of investment. However, when there is a crisis, the credit available to domestic firms decreases, causing a decline in the level of investment. While these situations are happening, the interest rate spikes, generating a loss of confidence in the financial market by investors. Therefore, there would be a capital flight and a recession would occur. As a result of the recession, desperation for money arises and investors would require money to meet their financial obligation. Banks would go to the Central Bank to get credit in order to carry out their activities. Therefore, a government would resort to borrowing, which would in turn result in a high rate of public debt. A conceptual framework was also developed based on the theoretical framework and the literatures reviewed in chapters two and three. The framework aided in illustrating the theoretical linkages between public debt, financial instability and economic growth. These variables – interest rate, money supply, investment, and public debt form the basis of our econometric model which is discussed in the next chapter.

CHAPTER SIX

RESEARCH PLAN AND METHODOLOGY

6.1. INTRODUCTION

This chapter explains the methodology and methods used in conducting this research. Research is usually based on underlying philosophical assumptions, validating the research methods and approaches used for the expansion of knowledge in a research. Therefore, in order to carry out any study, it is essential that we know what these philosophical assumptions are.

This chapter focused on discussing these assumptions and how they are implemented in this study. Some general philosophical suppositions were presented and discussed. The positivist philosophy was recognised as the framework for analysing and answering the research questions itemised in section 1.5. Since the positivist philosophy was chosen, a quantitative research method was employed as the researcher intended to develop knowledge through cause and effect thinking, reduction of social phenomena to specific numerical values, and hypothesis testing.

The research design was also explained. The research design was inspired by the research questions and the research philosophy adopted. The scope of the study was discussed along with the source from where the data was collected. The variables and econometric tests used in the study were also detailed in this chapter.

6.2 RESEARCH PHILOSOPHY

The manner in which research is conducted is in most cases, a result of the research philosophy adopted. It also influences the research strategy and tools used to attain their research objectives and to answer the research questions. A research process has three main dimensions namely – epistemology, ontology and axiology. The ontological and epistemological aspects are usually guided by the researcher's worldview, which has a significant influence on the perceived but relative aspects of reality (Thomas, 2010). Axiology on the other hand, has to do with the ethics and values of the researcher.

6.2.1 Epistemology

Epistemology refers to how we understand the world. In other words, it refers to information and understanding can be obtained through various kinds of inquiry and alternate methods of inquiry (Thomas, 2010). Two epistemological interpretations - realism and idealism are highlighted in this study.

Realism: Realism is a research philosophy that focuses on social phenomena. It is assumed that the world is a separate entity (external reality) and it is independent of the researcher and their activities. Realism discusses the external reality as being made up of frameworks of interconnected objects and the ways by which those objects relate with one another (Sobh and Perry, 2006). Therefore, a realist researcher views the world as a social construct in which the social events are the consequence of social actors. This external reality consists of conceptualised occurrences that are born of the researcher's mind but exists separately from the researcher. Realists recognise the distinction between the actual world and their opinion of it and then attempt to build several interpretations of this reality, taking into account time and place. Thus, the fundamental phenomena explored in a social science are mostly dependent on the researcher's experiences.

Three distinct realist epistemologies - naive, scientific and critical. Naïve realism maintains somewhat of a simple correspondence theory of truth where the world is mostly comprehensible, it is exactly how it looks e, as long as the research approaches and data collection instruments are satisfactorily crafted. Scientific realism takes into account that the logical methods can incorporate true depiction of the world and is common with positivist positions. Critical realism, on the other hand, suggests that the ways in which we observe the events around us dependent partly on opinions and predictions. Critical realism acknowledges an essential subjectivity in the development of knowledge, and it is mostly used by researchers with a constructionist position (Gray 2004).

Idealism: Unlike realism, idealism asserts that reality is a result of ideas and experiences of the researcher. This philosophy is founded and reliant on nature of the mind. Idealists are of the opinion that the world is epitomised by ideas, and these ideas can be figured out if there is no limit to academic investigation. They argue that natural scientists do not explain reality, they can only represent what is observed because reality does not have a mind of its own. Idealism negates the 'external reality' viewpoint of realists. They argue that a separate reality independent of how events appear does not exist. According to them, if we comprehend reality as people's experiences and beliefs, it logically suggests that reality is completely based on physical world occurrences and experiences by people (Chalmers, 2017).

In essence, idealism is a research philosophy that has to do with perception. It is the view that people are cognisant of everything that they are mindful of. For instance, a person is conscious of their own emotions, and their consciousness is not based on the mindfulness of anything else. For instance, it maybe factual that persistent pain can lead to anxiety, yet, this conclusion does not articulate anything about the pain in itself. The conclusion does not provide clues about the characteristics of pains, which one comes to know by having them (Bolender, 2001).

6.2.2 Ontology

Ontology is the branch of philosophy concerned with articulating the nature and structure of the world. It specifies the form and nature of reality and what can be known from it. One of the key differences between epistemological reasoning and ontological reasoning is that, ontology considers how the researcher develops his research questions (i.e. the researcher's dedication to certain understandings). The two viewpoints of ontology commonly used by social science researchers are objectivism and subjectivism (Saunders et al., 2012). In essence, ontology factors differ in realities, opinions and viewpoints of individuals and how it affects human behaviour. Two ontological ideas are discussed below – objectivism and subjectivism.

Objectivism: Objectivism adopts a natural science convention that the social reality studied is external to the researcher (also known as a social actor). This is because the events that social actors have lived through, do not affect the reality of the social world. (Saunders et al., 2009). The objectivist methods to social research were adopted from the natural sciences in order to explore social science events and occurrences.

An objectivist believes that knowledge can be attained free of the researcher's interests, ethics and views, therefore, they have no impact on what is studied or what approaches are utilised. They contend that the research methods and methodological designs are made impartially. Objectivists also consider causes and effects, and the research hypotheses are either confirmed or rejected in accordance with the study results. Furthermore, an objectivist supposes that reduction improves how a problem is understood (Holden and Lynch, 2004).

This research adopts an objectivist approach.

Subjectivism: Subjectivism arose as a result of arguments against objectivism. A subjectivist researcher assumes that social reality comes from opinions and experiences of individuals. Also, the researcher believes that knowledge acquisition is a continuous process since people have different experiences and different opinions about a social event, therefore, the research process has to be revisited from time to time to capture any changes (Saunders et al. 2012).

Subjectivism is distinct from objectivism in that the researcher emphasises the meaning of a social event as against measuring that event. The goal is to understand and to explain a problem in its contextual setting. Also, subjectivism does not embrace reducing social phenomena to small numbers, because of the perception that social phenomena can only be understood by exploring it wholly (Holden and Lynch, 2004).

6.2.3 Axiology

Axiology relates to the how values and ethics plays a part in the research process. It takes into consideration how the choice of data collection technique or the interaction with research participants reflect our values and ethics. In other words, it is the aspect of philosophy that deals with value judgement. Values influences a researcher's choice as to what the truth is. Thus, rests on feelings and thoughts.

Therefore, under axiology, there are two choices a researcher must make – a decision on whether the research will be value-free and unbiased or that the research will be subjective and thus, biased. In value free research, the selection of the research topic and how to examine it can be governed by an objective measure rather than by opinions and views, while a biased research is driven by the researcher's fascinations, opinion, skills and views (Holden and Lynch, 2004).

This research is a value free and unbiased research because of the use of secondary data and also, the interpretation of the results is fact-based, reliable and can be generalised.

6.3 RESEARCH PARADIGMS

A research paradigm is the philosophical basis upon which a research is carried out (Collis and Hussey, 2014). It comprises of the ideological interpretations and norms that forms the way in which the researcher views the world. There are a number of paradigms that have surfaced over the years, and some of those paradigms are discussed below. All paradigms are created upon their particular ontological and epistemological conventions. Since the conventions are supposed, the philosophical foundations of every paradigm cannot be empirically verified or invalidated. Therefore, different paradigms intrinsically encompass opposing ontological and epistemological positions. Hence, they contain varying notions of truth and knowledge that reinforce their specific research method (Scotland, 2012).

Empiricism: Empiricism postulates that experience is the sole source of knowledge, and thus, should be the basis by which all hypotheses and theories are tested. Empiricism is a philosophical concept that highlights the areas of scientific knowledge that are evidence related, particularly those that were established through careful experimental arrangements (Uddin and Hamiduzzaman, 2009). Empiricists believe that validity and reliability can be achieved by means of precise observation and numerous recordings of similar activities. Furthermore, observation and experimentation, if properly used can lead to well-informed and unquestionable research findings that can be generalised (Dean et al., 2006).

Interpretivism: Interpretivism is a philosophical standpoint that knowledge is attained through subjective interpretation. An interpretivist believes that truth or knowledge is not universal, hence, the researcher seeks to examine and understand social events from his own point of view or experience (Aliyu et al., 2014). Another key aspect of interpretivism is that researchers operating within this philosophical stance usually prefer to study events in their natural environment in order to capture the various perspectives and viewpoints of their target population (Gicheru, 2013). An interpretivist assumes that there are numerous perceptions about reality because that different people have different understanding of a social phenomenon. Therefore, the researcher endeavours to work in conjunction with respondents to figure out their individual viewpoints, and then they (the researcher) interpret these experiences in relation to the research objectives. Therefore, an interpretivist research is inductive in nature or theory building.

In other words, an interpretivist researcher or scholar argues that there is no such thing as a global and universal truth. This type of researcher recognises, understands and analyses information based on his/her own perception, understanding and reference. They hold the opinion that uninterested and indifferent neutrality is unrealistic and realism or practicability of framework and background is imperative. The methodologies mostly used by these interpretivist researchers are field experiments, inductive reasoning and qualitative study (Aliyu et al., 2014). The concentration of the interpretivist is on comprehending the implications and understandings of social actors and to see the world in the social actor's viewpoint. This makes it highly contextual and it cannot be generalised.

Rationalism: Rationalism is the ideology that knowledge is a result of logic and not from experience. It is based on the assumption that human beings are rational beings that think logically and objectively, so they have capability to comprehend and describe their social world and also figure out the solutions to any questions they might have. A rationalist is of the opinion that reflection is enough to justify what is true or not true. This is because it is assumed that reasoning occurs even before an investigation is carried out. However, rationalism does not make a distinction between observational and theoretical statements, whereas all observations are theory dependent (Uddin and Hamiduzzaman, 2009).

Positivism: One of the oldest philosophies is Positivism. It came about as an effort to explain the abstract or supernatural. A positivist philosophy assumes that a researcher can acquire unbiased information by observation and that the information can be substantiated by testimonies about the circumstances, therefore, that information is factual and objective. The objectivity is realised by verifying with impartial tools such as empirical testing, questionnaires, surveys, etc. When tested again with these instruments, you will achieve the same results. This means that the positivist approach is reliable and can be generalised. The data gotten are usually evaluated by quantitative methods, which are also objective in that they can be proved by logical assessment irrespective of who uses such methods (Stern, 2004).

Positivists are of the opinion that reality is constant and should be recorded and explained from an unbiased point of view without a lot of interaction with what is being researched. The positivists also opine that the phenomenon studied has to be isolated and that the results should be consistent when retested using the same parameters and procedures. This usually comprises controlling reality with use of variables such as a single independent variable in order to achieve consistency, and also to design associations between some of the components of the social world. Therefore, forecasts can be done by making use of the previously recorded and explained realities and their associations (Gicheru, 2013).

In essence, the positivist philosophy is a consequence of the methods utilised by the natural sciences and is typified by the hypothesis testing gotten from theories that already exist. In other words, the positivist approach is characterised by deductive reasoning or challenging existing theories by measuring observable social reality. Therefore, it is founded upon logic, evidence, rationality and the emphasis are mainly on facts, gotten by direct observation and they are estimated empirically using quantitative methods such as surveys, experiments, statistical analysis, etc.

In social sciences, the positivist philosophy is an effort to achieve predictive and explanatory knowledge of the world and to do this; the researcher must test theories that are characterised by highly generalised statements, stating the relationships between social phenomena (Uddin and Hamiduzzaman, 2009). It also aims to recognise causal relationships and key laws that describes occurrences in social activities (Holden and Lynch, 2004). Therefore, a positivist accepts as true that knowledge is reached through a reductionist style, and thus, attaches significance and emphasis to neutrality, analysis, and repeatability. The researcher adopts a realist perspective and carries out an objective investigation of social events. The methodologies adopted by a positivist researcher includes quantitative analysis, experiments, surveys and deductive reasoning (Aliyu et al., 2014).

In this study, the positivist philosophy is adopted along with a quantitative approach. This is because the research uses deductive reasoning to ascertain quantifiable socioeconomic reality. The research is also reductionistic in nature as public debt, financial instability and economic growth are reduced into smaller variables discussed in section 6.8.

Determinism: Determinism is a post-positivist philosophy. Under the deterministic philosophy, it is believed that no action is random but that there are previously existing causes that determine effects or outcomes (Creswell, 2003). This means that a deterministic researcher assumes that current events are based on previous events that resulted in the present happenings, and they are driven by universal causal laws that functions within nature itself free from awareness.

Just like positivism, determinism is also reductionistic. This means that the ideas or phenomena studies are condensed into a small, distinct set of concepts for it be examined, including the variables that were used for testing the research hypotheses and research questions. Therefore, the phenomena studied by a deterministic researcher usually investigates causes that impacts results (Creswell, 2003).

6.4 TIME HORIZON

The time horizon aspect of research has to do with whether the research is a cross sectional study or longitudinal study.

A cross sectional study is one where the data is collected for one time period, usually a short period. This means that data is collected and analysed in various circumstances but within the same time period. Cross sectional studies are usually used to investigate large dataset and are usually used to establish comparisons between groups of people or organisations. One of the problems associated with cross sectional studies is how to determine what sample size is big enough to represent the population. Another problem is that cross sectional studies do not take into account the correlation between variables (Collis and Hussey, 2014).

A longitudinal study on the other hand is one where the researcher wants to understand an event that has happened on multiple occasion. In other words, the research covers more than one time period. It is often linked with a positivist philosophy. The aim is to investigate the dynamics of a research problem by examining the same variables over a long period in time. The repeated observations are done with an expectation of disclosing the discrepancies of the event under study. Therefore, it makes it feasible to provide possible clarifications from examining the dataset and the patterns that arise from the data (Collis and Hussey, 2014).

There are two variations of longitudinal studies – cohort studies and panel studies. Cohort studies includes assessing several groups with the same characteristics over a period of time. For example, a researcher might want to study behaviours of a group of university students (cohort) in the first year. The researcher might study newly admitted students, students who have spent three to six months in the university, and students that have spent more than six months in the university. Studying the various cohorts may disclose different characteristics or relationships among students. Panel studies on the other hand involves studying the same dataset over several time periods.

This research adopts a panel longitudinal study. Certain variables have been identified to examine the effect of public debt and financial instability on economic growth. Data has also been collected for a number of years on those variables to understand the relationship among those variables as it pertains to this study.

6.5 RESEARCH APPROACH

The research approach refers to the plans and procedures used in carrying out a research, how data is collected, analysed and interpreted. There are three main research approaches – inductive approach, deductive approach and abductive approach. If a researcher wants to assess a theory, deductive approach is recommended. If the researcher wants to construct a theory, inductive approach is recommended. Furthermore, if the researcher wants to create or adjust a prevailing theory by using extra data collection, then abductive approach is recommended (Saunders et al., 2012).

Deductive Approach: The deductive research approach is employed when the researcher wants to test a theory. The process starts with a theory, then hypotheses are formulated, then data is collected and tested, and finally a theory is rejected or accepted. The data collected is used to test the research hypothesis, which also makes it possible to generalise under the deductive approach.

Deduction makes it possible for the researcher to explain causal associations between variables. Also, it allows facts to be reduced and measured in a quantitative manner. Therefore, this research approach makes it possible to study a large sample size or data set.

Inductive Approach: The inductive research approach is usually employed when the researcher wants to understand the nature of a problem. Unlike the deductive approach where a theory is tested, established suppositions are used to develop unverified inferences under the inductive approach. This approach does not comprise of hypotheses formulation. It begins with the research questions and objectives that a researcher aims to accomplish at the end of the study. The outcome of this approach is usually the origination of a theory, frequently articulated as a conceptual framework. However, the results from an inductive approach cannot be generalised because of the limited sample size and the nature of the research.

Abductive Approach: This research approach is used for explaining partial observations or shocking facts stated at the commencement of a study. It starts with the partial observations and then identifies likely theories on how those observations must have taken place. It also makes it possible for theory creation, amendment of a theory, or integrating existing theory where necessary.

The approaches discussed above can be used by using quantitative and/or qualitative methods of data collection.

6.6 RESEARCH METHODS

Research methods refers to the instruments and techniques used in carrying out research. It can be quantitative, qualitative or mixed method.

Quantitative Method: This method is used to test associations between variables that can be calculated mathematically and investigated using a wide range of statistical tests. It usually takes into consideration unbiased modes of data collection in order to ensure validity of results (Saunders et al., 2012). Quantitative methods are usually linked with a deductive approach and a positivist paradigm. Despite this, quantitative researchers incorporating an inductive approach can adopt this method as well, when the data collected is used in the development of a theory. That said, this research employs the quantitative method of data collection and empirically tests for the relationship between public debt, financial stability and economic growth.

Qualitative Method: This method examines the research participants' viewpoints and uses a variety of data collection techniques (such as interviews, case study groups, etc) and a logical process to create a conceptual framework. The data collected when using a qualitative method is non-numerical. The qualitative method is usually linked to an inductive approach, but some researchers can start with deduction or abduction (Saunders et al., 2012). Qualitative methods are also linked with an interpretivist paradigm (Collis and Hussey, 2014). The researcher has flexibility in data collection and the questions asked to respondents tend to be open ended. This is done so as to capture as much information as possible.

Mixed Method: This method is adopted when a researcher collects both measurable and non-measurable data. The researcher may also choose to use either a deductive or inductive approach (Saunders et al., 2012). Mixed method is usually adopted because the researcher believes this method will provide a wholesome understanding of the research problem, rather than using a quantitative or qualitative method alone.

6.7 RESEARCH DESIGN

The differences in philosophical perspectives in each paradigm combined with the aims of a study in most cases determines the focus, approach and enquiry mode, which in turn determines the structure of a research design (Kumar, 2011). This research adopted a Positivist philosophy and used a quantitative approach in getting measurable data from secondary sources. These sources include publications such as books and journal articles, continuously used for compiling the latest information. The research approach employed was deduction as the Theories of Business cycle inspired the research questions and the variables used for estimation. The econometric software used in the analysis of this work is E-views 9.5 as well as Microsoft Excel. The econometric tests to be used include unit root tests, cointegration and vector error correction model. Other post estimation tests were also carried out such as the cumulative sum test, serial correlation test and granger causality test.

i. Unit root test

The unit root test is done to check for the stationarity or non-stationarity of a time series dataset. Prior to conducting statistical analysis, it is important to check for the presence of unit root so as to avoid spurious regression results. Stationary tests are important because if the result is spurious, the data can no longer be used for forecasting.

In order for a non-stationary data to be stationary, the variables have to be integrated in the first difference so that it is said to be integrated of order one I(0). Hence, variables integrated in the order of I(1) series enclose one unit root. While, I(2) encompasses 2 unit roots and so it has to be differentiated at least two more times before it can be stationary. There are several variations of the unit toot tests such as the Kwiatkowsi-Phillips-Schmidt-Shin test (KPSS), Augmented Dickey Fuller (ADF) and the Phillips-Perron test (PP). However, this research made use of the Phillips-Perron tests. The unit root can be examined in three ways

a. No Constant No trend

$$\Delta\varkappa_t = \gamma\varkappa_{t-1}+\mu_t \qquad \text{(i)}$$

b. With Constant and No Trend

$$\Delta\varkappa_t = \alpha + \gamma\varkappa_{t-1}+\mu_t \qquad \text{(ii)}$$

c. With Constant and With Trend

$$\Delta\varkappa_t = \alpha + \gamma\varkappa_{t-1}+ \lambda_t +\mu_t \qquad \text{(iii)}$$

The situation when $\gamma = 1$ matches the random walk which is non-stationary.

ii. **Lag-Length Selection Criteria**

A lot of time series analysis calls for the use of lagged values of the variables. This is because some statistical analysis integrates lagged values of the dependent variable(s) in explaining movements in the independent variables. Therefore, it is important to know the highest number of lagged values that can be incorporated in a test. If the chosen number of lags is smaller than the definite number of lags, it can lead to wrong results as there might be presence of autocorrelation in the residuals. While a greater number of lags than the definite number of lags can create an increase in errors of the mean square forecast. The popular types lag selection criteria are the Schwarz Information criteria (SIC), Hannan-Quinn Information Criteria (HQIC) and the Akaike Information Criteria (AIC).

iii. Cointegration Test

The purpose of a cointegration test is to identify the likely information on the equilibria relationships among variables of a model in the long run. According to econometric assumption, two or more variables in a model will be cointegrated if there is a long run association between them. There are several types of cointegration test, but the ones used in this study includes the Autoregressive Distributed Lag (ARDL) cointegration test, also known as the Bounds cointegration test and the Johansen Cointegration test.

Unlike other cointegration tests, all the data does not have to be stationary for the ARDL cointegration test. It can be used whether or not the data is integrated in order of I(0), I(1) or both combined. The long run relationship in his test is determined through the F-stat. If the value of the F-stat exceeds the critical value band, a long run relationship is present. However, if it does not exceed the critical value brand, the reverse is the case. Nevertheless, testing for cointegration is an essential step of establishing if a model empirically exhibits meaningful long-term relationships. If cointegration is not detected in the variables, it is important to work with the variables at first difference (Nkoro and Uko, 2016).

On the other hand, the Johansen cointegration test can only be carried out if the data is integrated in order I (0) or I (I). Similar to the bounds test, if there is a cointegrating relationship among the variables, it means that a long run relationship exists. However, if the estimated results are not cointegrated, then there is no long run relationship between the variables. If a cointegrating relationship exists, then we proceed to do an error correction regression (also known as error correction model). In this research, both methods discussed were adopted based on the preliminary test results.

iv. Error Correction Model

The error correction model (ECM) is a time series model that measures the speed of adjustment by which the dependent variable reacts to equilibrium changes in the explanatory variables. In other words, it estimates the short run impact of the explanatory variables on the dependent variable. The coefficient of the lagged error correction term (ECT) represents the short-run adjustment(s) coefficient reflecting the degree by which the long-run equilibrium in the experimental variable is adjusted in the short run.

v. Cumulative Sum Test

The Cumulative Sum (CUSUM) test is a stability test. It maps the cumulative sum of recursive residuals in the model along with two lines that represents 5% critical level (Zeileis, 2004). The critical lines represent break points. Therefore, if the CUSUM line is positioned between critical lines, then the model is said to be stable. However, if there are instabilities in the model, the CUSUM line moves beyond the 5% critical lines.

vi. **Serial Correlation Test**

The serial correlation test is done in order to ascertain if the error term of a variable is correlated over a period of time. However, it is vital to note that the presence of serial correlation does not automatically mean that the results of prior statistical tests are biased. It just means that the current error term of a variable is highly dependent on the previous period's error term.

If serial correlation is detected, it indicates that the results from previous statistical tests might not be exact. This is because the standard errors of a serially correlated variable would appear to be smaller than the actual standard error. Therefore, the estimation of statistical significance will be exaggerated.

vii. **Granger Causality Test**

Granger causality test is conducted to determine if there is a causation between two variables. The test examines if the lagged value of Y has a significant influence on X, and if the lagged value of X has a significant influence on Y (Alimi and Ofonyelu, 2013). It is important to note that granger causality does not really infers that one variable causes the other, it is mostly a linear prediction. Granger causality assesses if an event occurred before another event and aids in predicting it (Sorensen, 2005).

It is assumed that if the cointegration test result confirms the presence of cointegration among variables, then there should be evidence of causality as well. If this is not the case, then there is a problem with the cointegration results. On the other hand, if the cointegration result does not confirm cointegration among the variables, there is no need to conduct a granger causality test. In this research, the

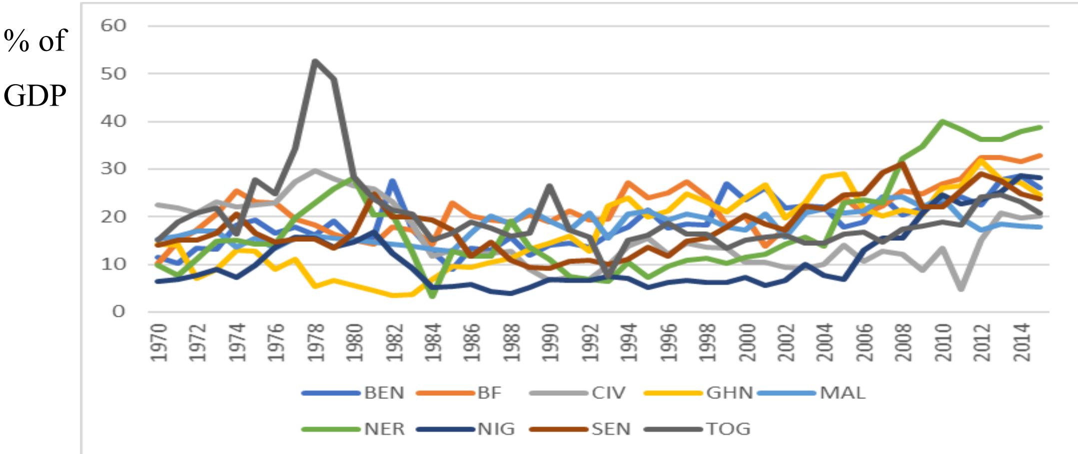
Toda-Yamamoto approach to causality was used. The reason for using this approach is because the Toda-Yamamoto method is one of the few Granger causality test regularly done by estimating an autoregressive model. Similar to the ARDL cointegration test, Toda-Yamamoto tests estimates the autoregressive model at level.

6.8 DATA SOURCE AND DATA DESCRIPTION

As mentioned in the introductory chapter, the overall aim of the study to examine the effect of public debt and financial instability on economic growth. Panel time-series data from the World Development Indicators for a period between 1970 to 2015 was used for the analysis. The data covers several economic variables of 9 West African countries namely Benin (BEN), Burkina Faso (BF), Cote D'Ivoire (CIV), Ghana (GHN), Mali (MAL), Niger (NER), Nigeria (NGR), Senegal (SEN) and Togo (TOG). The World Bank development indicator was mainly used for the compilation of data. These variables include gross capital formation (GCF), Trade (TR), growth rate of GDP (GR), external debt stock (DBT), private sector credit (PSC) and Broad Money (M3). Two additional variables were added later on in order to carry out a robust analysis, namely Inflation (IN) and government spending (PX).

Gross Capital Formation (GCF): This refers to the net increase in physical assets within a given time. It does not consider devaluation of fixed capital and does not include land acquisitions. In this study, it is used as the proxy for aggregate investment. Investment is a key element of a country's economic growth because it has a strong influence on the level of productivity of an economy. In other words, an increase in investment helps to improve GDP, create employment opportunities and also raise income levels. Furthermore, a rise in investment suggests a significant rise in investors' confidence. Investment also has an inverse relationship with interest rate. Therefore, when interest rate is high, the cost of obtaining a loan becomes expensive, causing a decline in investment levels.

Figure 6.1: Gross Capital Formation (% of GDP)

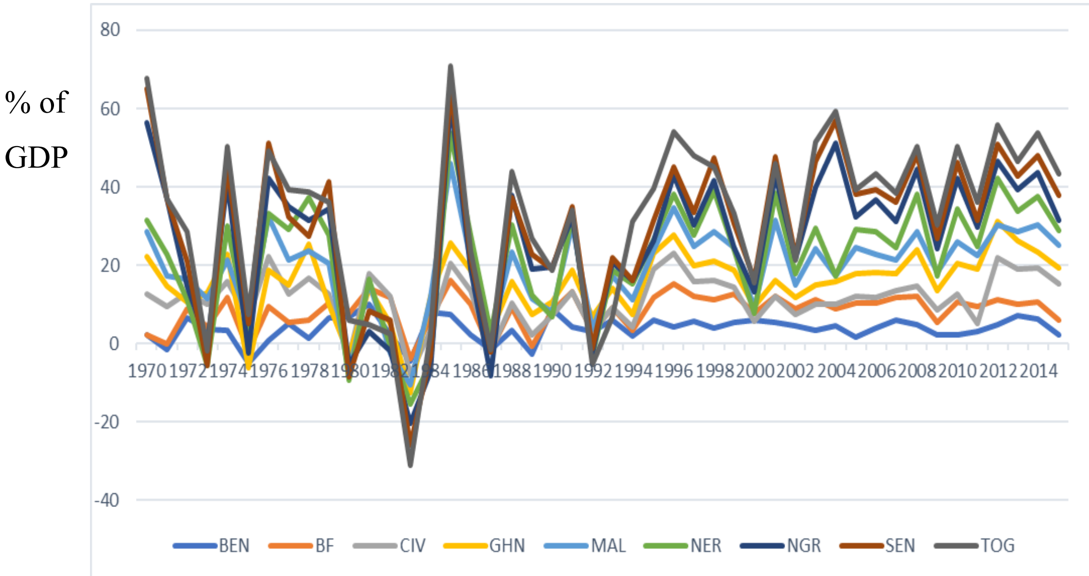


Source: Authors Computation, 2018

The above graph shows the trend in gross capital formation for the specified countries. It can be seen that there was a severe fall in the level of investment between 2007 and 2010. This can be attributed to the global recession that affected world economies around that period. However, this decline differs among the countries. It can be seen that it is steeper in the case of Senegal and Cote D'Ivoire while it was gradual in Burkina Faso. Niger on the other hand seemed not to have been affected until after 2010 with a short period of decline until about 2012. It can also be observed that there seemed to be quick recovery among the countries irrespective of the fluctuations in the level of investment.

Growth Rate of Gross Domestic Product (GR): This is the dependent variable of this research. The gross domestic product (GDP) is the monetary estimate of all fully produced goods and services in a country in a particular period of time, usually a year. The growth rate of GDP measures how fast an economy is growing. It is usually adjusted for inflation. This is an important indicator of an economy's growth. If an economy is experiencing a boom, the growth rate will be positive. This will mean that there is low employment rate; higher investment activities and businesses are growing. On the other hand, if an economy is having a downturn or slowing downturn, it could be because of investment falling and unemployment levels rising. This in turn can lead to a recession and thus, growth rate will be negative.

Figure 6.2: Growth Rate of GDP (Annual %)



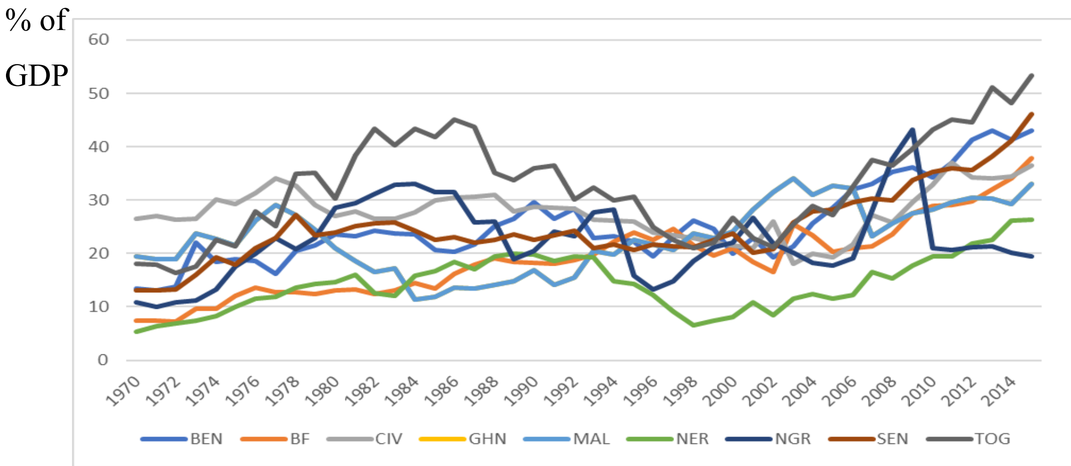
Source: Author's Computation, 2018

From the above graph, we can see that the countries follow a similar trend in certain periods. This is because some of the countries have the same regional/Central Bank.

We can see periods where the growth rates fell below zero. Furthermore, during the era of the global financial crisis, the growth rates of GDP for Nigeria and Cote D'Ivoire were close to zero. However, Cote D'Ivoire had a quicker recovery than Nigeria. The overall period shows steady rise and fall in the growth rate. Unlike the other countries, Benin and Senegal do not have steep fluctuations in their growth rate. They seemed to have a steady and gradual fluctuation up until 2013. This could be as a result of the inability to conduct trade compared to their neighbours, causing their GDP growth rate to be steady and low.

Broad Money (M3): Broad money on the other hand is a measure of money supply that includes both liquid and non-liquid forms of money. In other words, broad money takes into account commercial bank demand deposits, currencies, assets and non-institutional money market accounts. These variables serve as a proxy for monetary policy in this analysis. In order to achieve set macroeconomic objectives and financial stability, policymakers or the government can choose to adjust the interest rate or money supply. An expansionary monetary policy is associated with a rise in money supply and a reduction in interest rate to boost the economy, while a contractionary monetary policy signifies a reduction in money supply and increase in interest rate to tighten the economy Alterations in money supply and/or interest rate have an effect on the level of investment and on stock market activities especially on expected return on investment.

Figure 6.3: Broad Money (% of GDP)

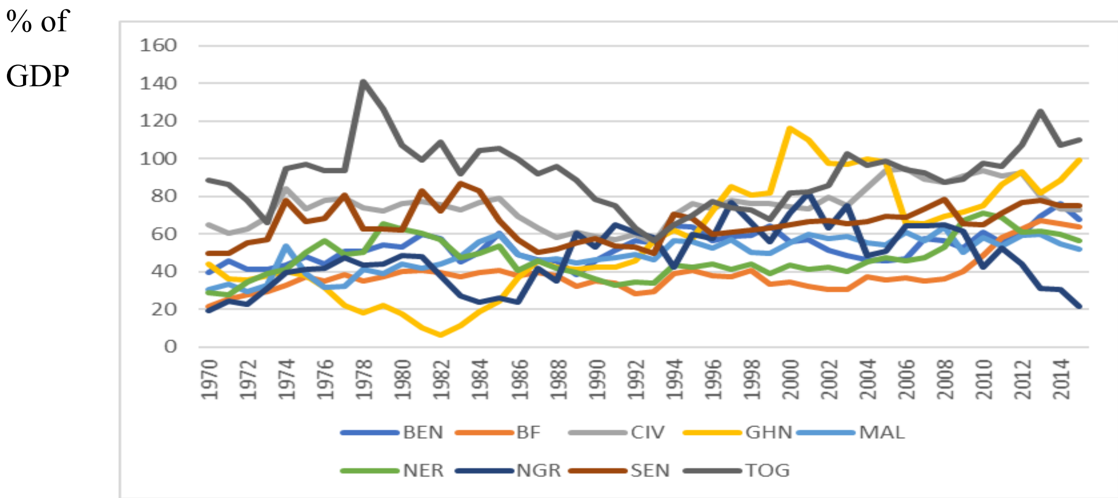


Source: Author's Computation, 2018

The above graph shows the trend in broad money of the sample countries from 1970 to 2015. It can be observed that there is a similar pattern in the rise and decline in money supply among countries. However, there is a sharp and steep decline in Nigeria's broad money between 2008 and 2010, while that of other countries was not as steep. This denotes a dissimilarity in policy remedies to the global financial crisis. Also, while Nigeria has its own independent monetary authority, the other countries all respond to policies by BCEAO (a regional monetary authority) with the exception of Ghana. Therefore, Nigeria makes its own monetary policies in respected to how much money is in circulation. This is the case for Ghana as well. However, the regional bank is responsible for the other countries' monetary policy. This means, whatever monetary policy decision was taken by the BCEAO, the member countries (Benin, Burkina Faso, Cote D'Ivoire, Mali, Senegal and Togo) have to oblige irrespective of whether it hurts or improves the economy.

Trade to GDP ratio (TR): This represents the value of a country's international trade. It is an important economic indicator as it is measured by dividing the total trade by the GDP over a given period. Also, as mentioned earlier (see section 5.2), trade played an important part with respect to how the recent financial crisis affected the selected West African countries.

Figure 6.4: Trade as a percentage of GDP

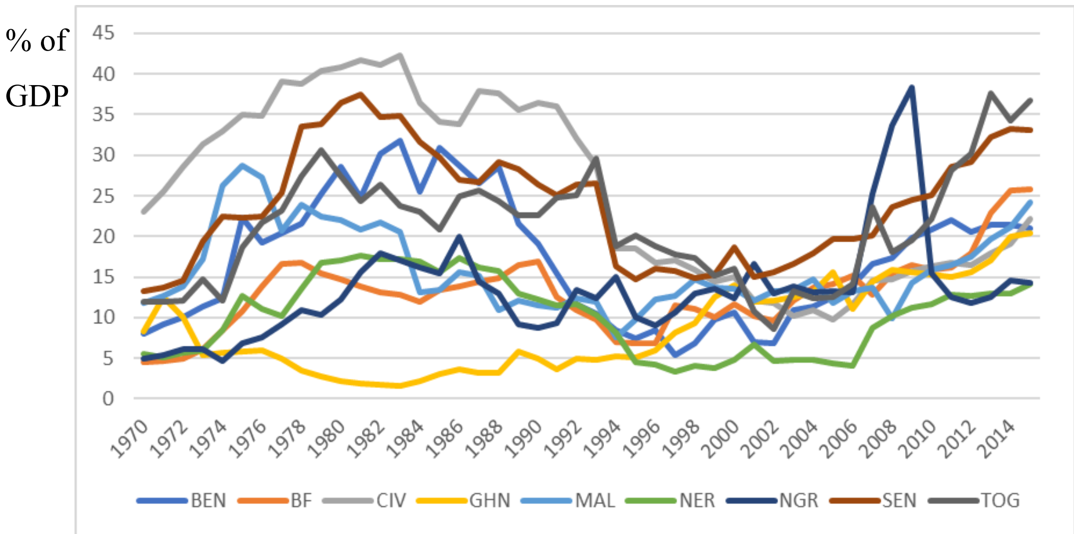


Source: Author's Computation, 2018

We can see from the above graph the trend in Trade (% of GDP) from 1970 to 2015. It can be observed that the fluctuations in trade levels are steep and intense. This is because trade is one of the most impacted areas when there is an instability among the West African countries. Nigeria is an oil exporting country, therefore when there are fluctuations in oil prices, the impact is visible. Similarly, when there are fluctuations in the price of Gold or cocoa, the impact on trade is visible. However, it can be seen that Ghana had a sustained increase in their trade level between 2012 upwards, which can be attributed to the discovery of oil which also contributed to the exports, and hence, trade levels. Similarly, Togo had a steady rise in Trade levels between 2010 and 2012, which can also be attributed to expansion in their cotton and phosphate sectors.

Private sector credit (PSC): This refers to the domestic credit or capital given to private investors by financial intermediaries. This can be in form of loans, securities, or trade credits. A well-structured and stable financial condition is necessary for sustainable economic growth. It enables an increase in the investment levels, a higher return on investment, and more importantly, it boosts the manufacturing aspect of the economy. An efficient private sector is important for an economy because of the contribution towards creation of jobs, allocation of resources and contribution to GDP. The figure below shows the private sector credit (% of GDP) for the selected West African countries.

Figure 6.5: Private sector credit (% of GDP)



Source: Author's Computation, 2018

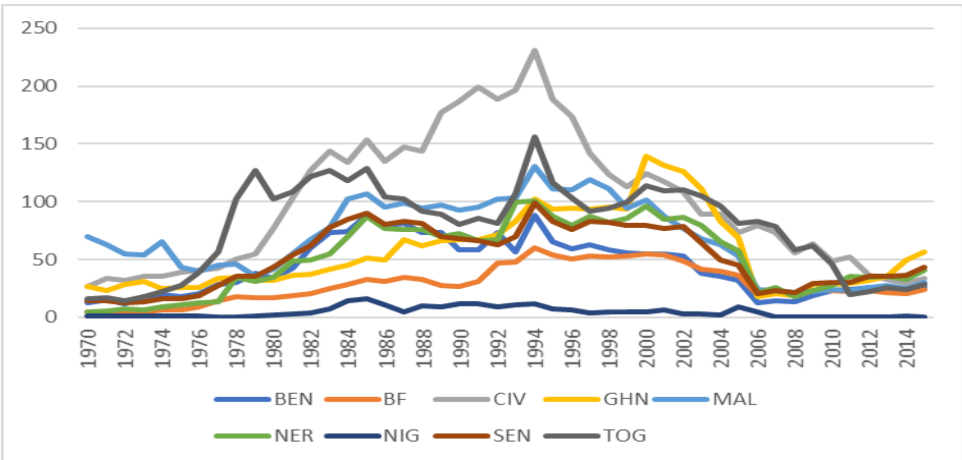
Figure 6.5. above shows the trend in private sector credits for the selected West African countries. It can be seen that there was a sharp decline in private sector credit for all countries between late 1993 and 1994. The reason for this was a devaluation of the CFA francs (IMF, 2003). Also, we can see a sharp increase in Nigeria between 2006 and 2008. This was a result of the bank consolidation

exercise in 2004, which saw a rise in the number of private banks (Ajakaiye et al., 2016). This led to an increase the economic activities such as investment and production. However, due to a fall in oil prices and the global financial crisis, there was a sharp decline from 2010 all the way unto 2012.

Public Debt (DBT): It refers to the total amount of money owed by the government to foreign lenders including other governments and international financial organisations. Public debt is one of the methods for financing budget deficit and can also be used to finance capital projects by the government (such as roads, construction of houses, bridges, hospitals, etc). It can also be used to bail out the private sector.

Figure 6.6: <u>External Debt Stock (% of GDP)</u>

% of
GDP

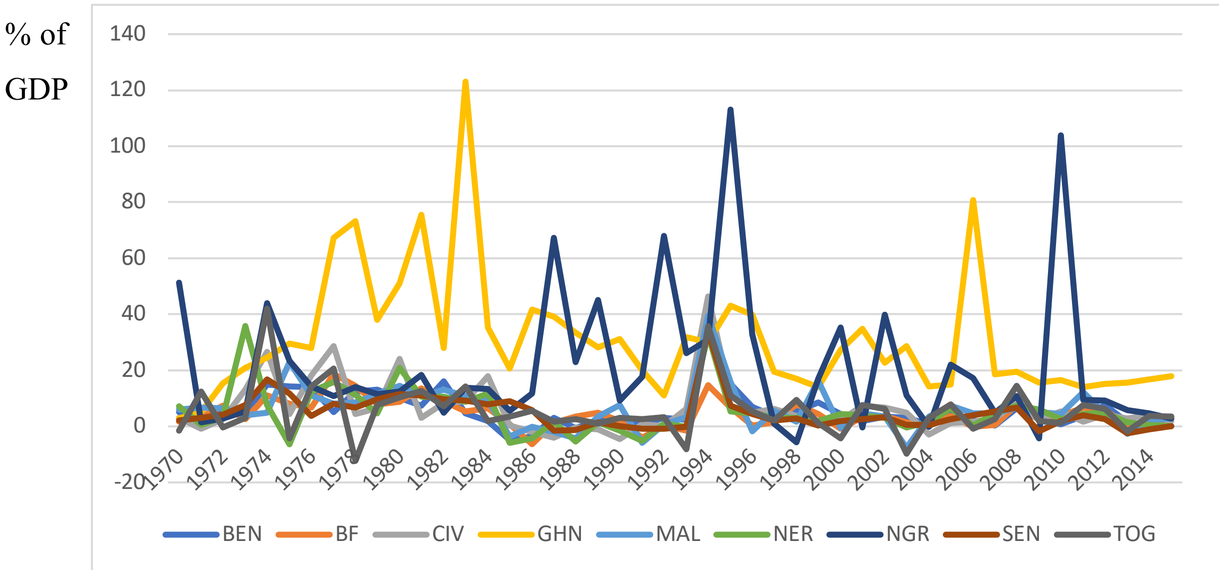


Source: Author's Computation, 2018

Figure 6.6 shows the fluctuations in the level of public debt (% of GDP) of the selected West African countries. It can be seen that the trends all flow in a similar manner. There was a spike in the debt level between 1993 and 1994, which is in agreement to the devaluation of the CFA Francs. This was because the governments of these countries had to borrow in order to handle their obligations. Furthermore, we can see a decline in debt levels from 2004 onwards which is attributed to debt relief and financial aid by the IMF and other international organisations. This make it possible not to have high accumulated debt as the money given by those organisations are not owed but a form of debt relief for those countries.

Inflation (IN): This usually refers to either a rise in money supply or a rise in general price levels. Fluctuations in supply of money in most cases affect the inflation level. The levels of inflation affect investors' borrowing capacity, their costs of production as well as potential return, also affecting the purchasing power of money. Furthermore, inflation has an inverse relationship with interest rates. A reduction in interest rate causes people to borrow more money, leading to rise in spending. This rise in spending leads to a rise in inflation levels.

Figure 6.7: Inflation

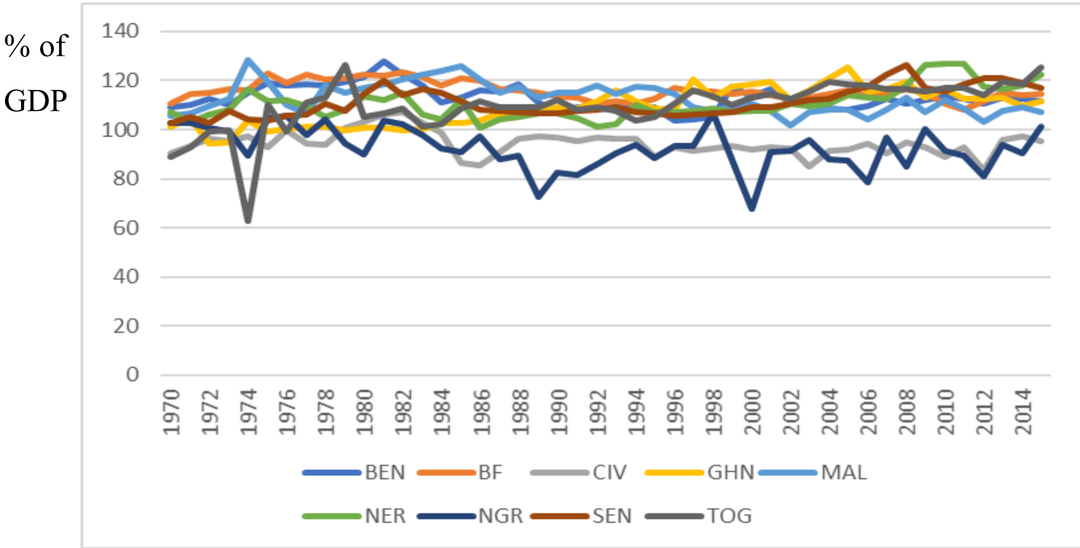


Source: Author's Computation, 2018

It can be observed that the inflation levels for Ghana and Nigeria are higher than those of Benin, Burkina Faso, Mali, Niger, Senegal and Togo. This is because, Ghana and Nigeria have their own independent Central Bank who can make their own policy decisions in accordance with an economic situation. Therefore, they can raise inflation levels or reduce inflation levels depending on the shocks to the economy, while those other countries have to wait for the BCEAO to make monetary policy decisions on their behalf. Also, Ghana and Nigeria are the richer economies among those countries, therefore, there are higher levels of economic activities in those countries. Hence, a shock to the economy has a much dearer effect than in the other countries.

Public Expenditure (PX): This refers to the total spending by a government of a country. It includes spending on capital projects, pension, provision of welfare, etc. Public expenditure is also one of the fiscal policy tools, and can sometimes to be used to regulate the money supply in the economy. Therefore, it is used in this study as a proxy for fiscal policy.

Figure 6.8: Government spending (% of GDP)



Source: Author's Computation, 2018

The above figure shows the trend in government spending (% of GDP) for the selected West African countries. It can be seen that Nigeria has the lowest government spending ration compared to others. However, they also have a steeper trend. This is because of the fluctuation in oil prices. Oil makes up over 80% of Nigeria's revenue, therefore, any shock in oil prices, limits the ability of the government to spend. It can also be observed that the overall spending level for government also dropped for all countries between 2009 and 2012. This was a result of the global financial crisis in that time period.

6.9 MODEL SPECIFICATIONS

In econometric analysis, a model is essential. The model includes at least one dependent variable and one or more independent variables. The econometric model for this research is developed from the consistent factors gotten from the theoretical framework (see Chapter 5). The consistent factors affecting economic growth according to the theories were investment, money supply and credit to private businesses. According to the Austrian Business Cycle (discussed in section 5.2), the level of economic growth is affected by the money supply, level of investment and financial resources available to financial institutions. In Marx's analysis of the business cycle (discussed in section 5.3), the level of economic growth is determined money supply as well as credit available to investors and financial institutions. Also, from the Financial Instability Hypothesis (discussed in 5.4), the main influence of level of economic growth are investment levels and financial resources available to financial institutions. Additionally, we could see in section 4.7 that Debt and Trade are some channels by which the financial crisis affected the selected West African countries. Therefore, unique econometric models are developed in this study for evaluating the implication of financial instability and public debt on economic growth. This research has two research questions (See section 1.5) and these are examined using two econometric models.

The model used in testing the first research question is expressed as:

$$GR = \beta_0 + \beta_1 DBT + \beta_2 GCF + \beta_3 PSC + \beta_4 M3 + \beta_5 TR + \varepsilon \qquad \text{(iv)}$$

Where:

GR = is the dependent variable and is the annual growth rate of GDP. This is a proxy for economic growth.

DBT = External debt stock (% of GDP). This is a proxy for public debt.

GCF = Gross Capital formation (% of GDP). This is a proxy for investment

PSC = Private sector credit (% of GDP). This is a proxy for financial resources available to financial corporations and financial intermediaries.

M3 = broad money (% of GDP).

TR = Trade (% of GDP).

The second model used in testing the second research question is expressed as

$$PSC = \chi_0 + \chi_1 DBT + \chi_2 IN + \chi_3 PX + \chi_4 M3 + \varepsilon \qquad (v)$$

Where:

PSC = Private sector credit (% of GDP) and is the dependent variable. This is a proxy for financial resources available to financial corporations and financial intermediaries.

DBT = External debt stock (% of GDP). This is a proxy for public debt. It is also a fiscal policy instrument

PX = Government spending (% of GDP). Government spending is a fiscal policy instrument

IN = Inflation. This is a monetary policy instrument

M3 = broad money (% of GDP). This is money supply, which is also a monetary policy instrument.

6.10 STATEMENT OF HYPOTHESES

The research hypotheses for this study (derived from the research objectives stated in section 1.5) are

1. H_0: public debt and financial instability has no effect on economic growth of selected West African countries

   H_1: Public debt and financial instability has an effect on the economic growth of selected West African countries

2. H_0: Monetary and fiscal policy instruments are not effective in addressing financial instability.

H_1: Monetary and fiscal policy instruments are effective in addressing financial instability.

6.11 CONCLUSION

In this chapter, the research philosophy, research approach and the research method adopted was discussed. This research adopted objectivism as its ontological perspective and realism as the epistemology. This is because objectivism and realism restrict a researcher from having a biased research and denote a scientific method of carrying out a study. This influenced the researcher to conduct a positivist research using a deductive approach and quantitative method for data collection and analysis.

Furthermore, an overview of the trends of each variable used in the study was provided. It was observed that the gross capital formation of the counties followed a similar trend but Senegal (SEN) and Cote D'Ivoire (CIV) had a steeper decline between 2007 and 2010, whereas, it was gradual for Burkina Faso. Looking at the trend for growth rate of GDP, it was observed that the trend for Nigeria (NGR) and Cote D'Ivoire was close to zero. However, Cote D'Ivoire had a quicker recovery from the crisis period. On the aspect of trade, Nigeria had issues because the level of trade declined steadily from 2010 up until 2015 because of the fall in oil prices. With regard to private sector credit, it was observed that there was a steep fall in credit between 1993 and 1994, which was due to a devaluation of the currency.

This chapter also specified new econometric models for testing the effect of public debt and financial instability on economic growth of West African countries; and for testing the effectiveness of macroeconomic policy instruments in addressing financial instability. The statement of hypotheses was also specified. The next chapter will present the analysis results and interpretations.

CHAPTER SEVEN

EMPIRICAL ANALYSIS AND RESULT INTERPRETATION

7.1 INTRODUCTION

The purpose of this chapter is to analyse the data and interpret the various tests. Two sets of cointegration tests were carried out in an attempt to answer the research questions stated in section 1.5. The first research question was tackled using the ARDL Bounds cointegration tests (section 7.4 to 7.9), while the second research question was tackled using the Johansen cointegration test in order to determine the effectiveness of policy response in the West African region (section 7.10 to 7.11). Other post-diagnostic tests were also carried out to check for serial correlation, causality and stability of the model.

7.2 DESCRIPTIVE STATISTICS

The descriptive statistics are also known as summary statistics, which is useful for describing the basic features of the data. The descriptive statistic also helps researchers to display large data in a summary table. The mean is the average value of the variable while the median is the middle value of the variable or average of the two middle values of the variable. The standard deviation is a measure of variability and shows volatility in the variables. It is also used to measure how spread out the data is from the mean. A higher standard deviation means there is a greater spread in the data.

Skewness, Kurtosis and Jarque-Bera show if the data has a normal distribution. The skewness depicts asymmetry from the normal distribution in the dataset. The kurtosis assesses the distribution of the dataset while the Jarque-Bera calculates the difference between skewness and kurtosis of the data from a normal distribution.

Table 7.2.1: Descriptive Statistics for Benin

Benin	GR	DBT	GCF	M3	PSC	TR
Mean	3.731869	43.52897	18.61521	25.42634	17.27469	53.34303
Median	4.093406	38.32135	17.98317	23.41357	18.26428	52.91957
Maximum	9.954231	88.42967	28.57381	43.00435	31.83996	76.53089
Minimum	-4.895345	11.58998	8.939974	13.15247	5.415283	38.30037
Std. Dev	3.167296	23.83528	5.045320	7.645561	7.705753	8.355959
Skewness	-0.783581	0.273905	0.219701	0.808349	0.199496	0.430655
Kurtosis	3.756469	1.718993	2.188885	3.019071	1.824932	2.927374
Jarque-Berra	5.804128	3.720398	1.631049	5.010316	2.951626	1.431998
Probability	0.054910	0.155642	0.442407	0.081663	0.228593	0.488704
Observations	46	46	46	46	46	46

Source: Author's Computation, 2018

The above table shows the summary statistics of the selected variables, which are external debt stock (DBT), Growth rate of GDP (GR), Gross Capital Formation (GCF), Broad Money (M3), credit to private sector (PSC), and Trade (TR) for Benin. The first two, mean and median are measures of central tendency. The mean shows the average value of each series. The average value for the growth rate of GDP was 3.73%, gross capital formation was 18.61%, and broad money was 25.42%, Trade was 53.34%, and so on. The maximum and minimum represent the highest and lowest values of each variable.

We can also observe from the standard deviation summary that GR has the least spread around the mean and TR has the greatest spread around the mean. The skewness statistic reveals symmetry of the data. GR has negative values, and hence, it is skewed to the left, while GCF, M3, PSC, DBT and TR are skewed to the right. The Kurtosis summary above indicates that the data has a positive kurtosis and has a sharper peak than a normal distribution.

Table 7.2.2: Descriptive Statistics for Burkina Faso

Burkina Faso	**GR**	**DBT**	**GCF**	**M3**	**PSC**	**TR**
Mean	4.557981	28.88188	21.50751	19.05487	13.06668	38.71458
Median	4.415739	24.51006	20.61818	18.62467	13.25276	37.43736
Maximum	11.01474	60.34118	32.83449	37.87074	25.85966	67.33890
Minimum	-1.778697	3.467744	10.27003	7.264333	4.443414	21.59701
Std. Dev	3.249772	16.17351	5.200520	7.186219	4.734819	9.979218
Skewness	-0.066046	0.289539	0.378547	0.483003	0.514711	1.497625
Kurtosis	1.938252	2.041516	2.857651	2.850783	3.866234	5.065633
Jarque-Berra	2.194117	2.403544	1.137456	1.831246	3.469304	25.37352
Probability	0.333852	0.300661	0.566245	0.400267	0.176462	0.000003
Observations	46	46	46	46	46	46

Source: Author’s Computation, 2018

The above table shows the summary statistic of the selected variables for Burkina Faso. The mean shows the average value of each series. The mean for GR was 4.55%, DBT was 28.88%, GCF was 21.5%, M3 was 19.05%, PSC was 13.06% and TR was 38.71%. The maximum statistic shows the highest values of each variable in the dataset. The maximum for GR was 11.01%, 60.34% for DBT, 32.83% for GCF and so on. The minimum values for each variable are -1.78% for GR, 3.47% for DBT, 10.27% for GCF, 7.26% for M3, 4.44% for PSC and 21.59% for TR. We can also see that the standard deviation statistics are similar to that of Benin where the summary of GR has the least spread around the mean and TR has the greatest spread around the mean. However, the skewness results show that GR is skewed to the left signified by its negative value, while the other variables are skewed to the right as indicated by their positive values. The Kurtosis statistics shows that the data has a positive kurtosis.

Table 7.2.3: Descriptive Statistics for Cote D'Ivoire

Cote D'Ivoire	**GR**	**DBT**	**GCF**	**M3**	**PSC**	**TR**
Mean	3.053575	99.70482	15.66062	27.70571	25.66822	75.19079
Median	2.468624	89.45033	13.47815	27.40030	24.28241	75.50876
Maximum	12.91640	230.7226	29.76217	37.06329	42.26380	95.06973
Minimum	-10.95770	26.31229	4.703723	18.15996	9.748175	55.34852
Std. Dev	4.753248	58.33320	6.545527	4.464621	10.89623	10.53405
Skewness	-0.150587	0.432991	0.468854	-0.038743	0.073433	0.058546
Kurtosis	3.308809	1.980423	2.100788	2.658675	1.420300	2.431791
Jarque-Berra	0.356632	3.429801	3.235104	0.234805	4.824291	0.645097
Probability	0.836678	0.179982	0.198384	0.889227	0.089623	0.724301

Observations	46	46	46	46	46	46

Source: Author’s Computation, 2018

The table above is the descriptive statistics for Growth rate of GDP (GR), public debt (DBT), Gross Capital Formation (GCF), Broad Money (M3), credit to private sector (PSC), and Trade (TR) for Cote D’Ivoire. We can observe that the average value for GR was 3.05%, DBT was 99.70%, GCF was 15.66%, M3 was 27.7%, PSC was 25.66% and TR was 75.19%. The maximum statistic displays the highest values, and that of GR was 12.91%, 230.72% DBT, 27.76% for GCF, 37.06% for M3, etc. It can also be observed that GR and M3 is skewed to the left reflected by its negative value, while the other variables are skewed to the right as shown by their positive values. Furthermore, the data has a positive kurtosis.

Table 7.2.4: Descriptive Statistics for Ghana

Ghana	GR	DBT	GCF	M3	PSC	TR
Mean	3.850813	56.90842	16.90758	22.92586	8.651859	57.02203
Median	4.651426	47.18775	17.78949	22.76131	5.953888	51.33136
Maximum	14.04600	139.4388	31.78475	34.10831	20.44463	116.0484
Minimum	-12.43163	18.23117	3.377636	11.30499	1.542268	6.320343
Std. Dev	4.636846	33.08579	8.078089	6.345978	5.453394	30.11926
Skewness	-1.250409	0.841336	-0.053944	-0.031214	0.451747	0.156542
Kurtosis	5.567911	2.683708	1.733665	1.954719	1.924806	1.886175
Jarque-Berra	24.62582	5.618563	3.095886	2.101644	3.780328	2.565704
Probability	0.000004	0.060248	0.212685	0.349650	0.151047	0.277245
Observations	46	46	46	46	46	46

Source: Author’s Computation, 2018

From the above table, the mean for GR was 3.85%, 56.90% for DBT, 16.9% for GCF, 22.92% for M3, 8.65% and 57.02% for both PSC and TR respectively. The maximum and minimum statistic shows the highest and lowest values in the data for each variable for Ghana.

We can also observe that the standard deviation of GR has the least spread around the mean and TR has the greatest spread around the mean (Similar to the data for prior countries). The skewness results show that GR, GCF and M3 have negative values, and hence, are skewed to the left, while DBT, PSC and TR are skewed to the right, reflected by their positive values. The Kurtosis result shows that the data has a positive kurtosis and has a sharper peak than normal distribution as well.

Table 7.2.5: Descriptive Statistics for Mali

Mali	GR	DBT	GCF	M3	PSC	TR
Mean	4.201445	67.86948	18.05226	22.92586	15.93721	49.33104
Median	3.978661	66.16387	17.89164	22.76131	13.80310	50.37339
Maximum	20.28663	130.8899	24.23647	34.10831	28.68894	63.78796
Minimum	-7.378433	21.57313	12.84285	11.30499	7.519248	29.59859
Std. Dev	5.246171	32.65586	3.072264	6.345978	5.071268	9.113033
Skewness	0.596747	0.051477	0.163343	-0.031214	0.850835	-0.653100
Kurtosis	3.978597	1.675946	2.095832	1.954719	2.803035	2.485158
Jarque-Berra	4.565651	3.380462	1.771467	2.101644	5.624416	3.778172
Probability	0.101996	0.184477	0.412411	0.349650	0.060072	0.151210
Observations	46	46	46	46	46	46

Source: Author’s Computation, 2018

The above table shows the descriptive statistics for Mali. The mean which calculates the average value of each variable shows that GR has an average of 4.2%, GCF has an average value of 18.5%, M3 has 22.92%, DBT has an average value of 67.87%, while PSC and TR have an average value of 15.9% and 49.33% respectively. The result of the standard deviation shows that GCF has the least distribution around the mean, whereas, TR has a greater distribution. It can also be seen that M3 and TR are skewed to the left, while GR, GCF and PSC are skewed to the right. The Kurtosis also points out that the data has a positive kurtosis, which means that each variable has a pointier peak than normal distribution.

Table 7.2.6: Descriptive Statistics for Niger

Niger	GR	DBT	GCF	M3	PSC	TR
Mean	2.513090	51.59570	18.07607	14.35261	10.31568	47.59864
Median	3.027450	52.26115	14.19545	14.31673	11.20515	45.59590
Maximum	13.47261	100.6434	39.95157	26.35485	17.66587	71.29019
Minimum	-17.04758	4.884976	3.148003	5.341825	3.302083	27.96890
Std. Dev	6.079947	30.25671	10.23906	5.262519	4.733915	10.71530
Skewness	-1.250965	-0.055765	0.871257	0.256859	0.012801	0.399127
Kurtosis	5.586050	1.611306	2.562992	2.415260	1.638780	2.442533
Jarque-Berra	24.81567	3.720077	6.185722	1.161167	3.552689	1.816961
Probability	0.000004	0.155667	0.045372	0.559572	0.169256	0.403136
Observations	46	46	46	46	46	46

Source: Author’s Computation, 2018

The table shows the descriptive statistics of the dataset for Niger. It can be observed that the values of the kurtosis are positive. This means that the distribution of the variables has a sharper peak than normal distribution. It can also be observed from the skewness statistic that GR and DBT both have negative values, meaning that they are skewed to the left, whereas, the other variables are skewed to the right.

On the other hand, the mean statistic shows that the average value for the variables were as follows: growth rate of gross domestic product was 2.51%, public debt was 51.60%, gross capital formation was 18.07%, broad money was 14.35%, domestic credit to private sector was 10.31% and Trade was 47.59%. Also, for the standard deviation, PSC has the least distribution around the mean and TR had the most spread around the mean.

Table 7.2.7: Descriptive Statistics for Nigeria

Nigeria	GR	DBT	GCF	M3	PSC	TR
Mean	4.406326	4.561789	11.18696	22.50928	47.68974	4.406326
Median	4.649226	2.897251	7.500000	21.16292	47.84429	4.649226
Maximum	33.73578	15.90144	28.60000	43.26613	81.81285	33.73578
Minimum	-13.12788	0.102561	3.800000	10.04202	19.62060	-13.12788
Std. Dev	7.908744	4.470953	6.871474	7.170380	16.43537	7.908744
Skewness	0.980340	0.869530	1.165016	0.528072	0.036901	0.980340
Kurtosis	6.665632	2.607286	3.222885	3.336285	2.101213	6.665632
Jarque-Berra	33.12216	6.092231	10.50089	2.354676	1.558756	33.12216
Probability	0.000000	0.047543	0.005245	0.308098	0.458691	0.000000
Observations	46	46	46	46	46	46

Source: Author's Computation, 2018

The table above shows the summary statistic of the selected variables for Nigeria. The mean statistic shows the average value of each series, 4.41% for GR, 11.18% for GCF, 22.5% for M3, 47.68% for PSC, 4.41% for TR and 4.56% DBT. The maximum statistic shows the highest values of each variable. The highest value for GR was 33.73%, 28.6% for GCF, 43.26% for M3, etc. The minimum statistic on the other hand represents the lowest of each variable, and it was 19.62% for TR, -13.12% for GR, 1.65% for GCF, etc.

Furthermore, the standard deviation statistic indicates that GCF has the least spread around the mean and TR has the greatest spread around the mean. The skewness statistic portrays symmetry of the data. GR and DBT have negative values, and so it is skewed to the left, while other variables have positive values, hence, are skewed to the right. The Kurtosis summary above indicates that the data for Nigeria has a positive kurtosis, meaning it has a sharper mount than normal distribution.

Table 7.2.8: Descriptive Statistics for Senegal

Senegal	GR	DBT	GCF	M3	PSC	TR
Mean	3.174860	52.27532	18.05891	24.96650	24.06998	65.86190
Median	3.714144	52.04227	16.90219	23.46235	24.73663	66.08529
Maximum	8.920504	99.00176	31.21957	46.07344	37.54706	86.96263
Minimum	-5.583240	12.84333	9.139009	13.05806	13.25781	49.63686
Std. Dev	3.511442	26.48212	5.782294	6.944473	7.169951	9.757863
Skewness	-0.775411	-0.042489	0.415524	0.927925	0.133525	0.135402
Kurtosis	3.151298	1.535872	2.311130	4.054188	1.804874	2.304075

Jarque-Berra	4.653557	4.122543	2.233269	8.731365	2.874316	1.068824
Probability	0.097610	0.127292	0.327380	0.012706	0.237602	0.586014
Observations	46	46	46	46	46	46

Source: Author's Computation, 2018

The table above shows the descriptive statistic of the selected variables for Senegal. The mean statistic represents the average value of each series, and was 3.17% for GR, 52.28% for DBT, 18.05% for GCF, 24.96% for M3, 24.06% for PSC and 65.86% for TR. The maximum statistic shows the highest values of each variable. The highest value for GR was 8.92%, 31.22% for GCF, 46.07% for M3, and so on. The minimum statistic on the other hand represents the lowest of each variable, and was -5.58% for GR, 9.13% for GCF, and so on.

Additionally, the standard deviation statistic indicates that GR has the least spread around the mean and TR has the largest distribution around the mean. The skewness statistic portrays symmetry of the data. GR and DBT have negative values, and so their skewness statistic is to the left, while other variables have positive values, hence, they are skewed to the right. The Kurtosis summary above indicates that the data for Nigeria has a positive kurtosis, meaning it has a sharper mount than a normal distribution.

Table 7.2.9: Descriptive Statistics for Togo

Togo	GR	DBT	GCF	M3	PSC	TR
Mean	2.833260	78.63435	20.16603	32.66345	21.20806	91.60133
Median	3.017300	90.50230	17.48062	32.49579	21.88825	93.12124

Maximum	14.98241	156.1958	52.68816	53.31023	37.67655	140.8602
Minimum	-15.09583	14.34610	7.477954	16.42907	8.633588	56.47844
Std. Dev	5.524629	38.91042	8.111330	9.718942	7.017464	17.09805
Skewness	-0.266014	-0.355332	2.445692	0.165754	0.302773	0.346478
Kurtosis	4.538047	1.934304	9.868672	2.070647	2.582801	3.490518
Jarque-Berra	5.076564	3.144773	136.2832	1.866056	1.036418	1.381525
Probability	0.079002	0.207549	0.000000	0.393361	0.595586	0.501194
Observations	46	46	46	46	46	46

Source: Author's Computation, 2018

The above table shows the summary statistic of the selected variables, which are external debt stock (DBT), Growth rate of GDP (GR), Gross Capital Formation (GCF), Broad Money (M3), credit to private sector (PSC), and Trade (TR) for Togo. The first two, mean and median are measures of central tendency. The mean shows the average value of each series. The average value for the growth rate of GDP was 2.83%, gross capital formation was 20.17%, etc. The maximum and minimum represent the highest and lowest values of each variable.

We can also observe from the standard deviation summary that GR has the least spread around the mean and TR has the greatest spread around the mean. The skewness shows if the data is symmetrical. GR and DBT have negative values, and hence, the statistic is skewed to the left, while GCF, M3, PSC and TR are skewed to the right. The Kurtosis summary above indicates that the data for Togo has a positive kurtosis, meaning it has a sharper peak than a normal distribution.

7.3 PRE-DIAGNOSTIC TESTS

These are time series tests done to check if the data to be tested are statistically viable. The common pre-diagnostic tests are the unit root test and the lag length selection.

7.3.1 UNIT ROOT TEST

This test is sometimes referred to as the test of stationarity or the integration order test. It is important because nonstationary data often lead to spurious regression and inaccurate results (Baumhol and Lycosa, 2009). Therefore, we start by making sure that the data used is integrated in the order of one or I(1). In this research, the Phillips-Perron Fisher Unit root test was used. The table below shows unit root results for Benin (BEN), Burkina Faso (BF), Cote D'Ivoire (CIV), Ghana (GHN), Mali (MAL), Niger (NER), Nigeria (NGR), Senegal (SEN), and Togo (TOG). The Null Hypothesis of the Unit root test is that there is presence of unit root at first difference.

Table 7.3.1: Unit root test results at first difference

Series	BEN	BF	CIV	GHN	MAL	NER	NGR	SEN	TOGO
D(GR)	0.0001	0.0001	0.0000	0.0000	0.0001	0.0001	0.0000	0.0001	0.0001
D(DBT)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D(GCF)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000
D(M3)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D(PSC)	0.0000	0.0004	0.0004	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000
D(TR)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Source: Author's computation, 2018

The values in the table are the P-values associated with individual series at first difference. We can see that the values are all zeros for the entire series. Since the p-values of each series is less than 0.05, we can reject the null hypothesis at 5% level of significance. Since the test was carried out at first difference, we can conclude that there is no unit root present and should therefore carry out further tests. The next test carried out is the ARDL cointegration test. Even though the ARDL cointegration test does not call for initial testing for unit root, it is important to know the amount of unit roots in the series tested (Nkoro and Uko, 2016).

7.3.2 **LAG LENGTH SELECTION**

The next step before undertaking a cointegration test and error correction test is to determine the accurate number of lags to be employed when carrying out those tests. The lag length selection involves a number of criteria including Final prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan-Quinn Information Criterion (HQ). The results are shown in the table below.

Table 7.3.2: Lag Length Criteria results

BENIN						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1053.572	NA	1.24e+12	50.55105	50.88203	50.67237
1	-857.2065	308.5744	2.40e+09	44.24793	47.22679	45.33980
2	-795.2168	73.79735	3.71e+09	44.34365	49.97039	46.40608
3	-686.1467	88.29484	1.25e+09	42.19746	50.47208	45.23043
4	-487.4386	85.16058*	38665395*	35.78279*	46.70529*	39.78632*

			BURKINA FASO			
0	-952.2112	NA	9.96e+09	45.72435	46.05533	45.84566
1	-757.8239	305.4658	21133736	39.51542	42.49429*	40.60730
2	-702.7996	65.50513	45486426	39.94284	45.56958	42.00526
3	-597.7180	85.06603*	18468581	37.98657	46.26119	41.01955
4	-404.5296	82.79505	745944.2*	31.83474*	42.75724	35.83827*
			COTE D'IVOIRE			
0	-1131.959	NA	5.19e+13	54.28375	54.61473	54.40506
1	-888.3083	382.8791*	1.06e+10	45.72897	48.70783*	46.82084
2	-828.2129	71.54213	1.78e+10	45.91490	51.54164	47.97733
3	-734.0037	76.26462	1.22e+10	44.47637	52.75098	47.50934
4	-563.6616	73.00378	1.46e+09*	39.41246*	50.33495	43.41598*
			GHANA			
0	-1105.385	NA	1.46e+13	53.01831	53.34930	53.13963
1	-908.7400	309.0129*	2.79e+10	46.70190	49.68077*	47.79378
2	-845.0403	75.83292	3.98e+10	46.71621	52.34295	48.77863
3	-753.0621	74.45861	3.01e+10	45.38391	53.65852	48.41688
4	-585.9439	71.62207	4.21e+09*	40.47352*	51.39601	44.47705*
			MALI			
0	-1058.768	NA	1.59e+12	50.79847	51.12946	50.91979
1	-893.6678	259.4431	1.36e+10	45.98418	48.96304	47.07605
2	-832.5324	72.78022	2.19e+10	46.12059	51.74733	48.18301
3	-752.6722	64.64875	2.96e+10	45.36534	53.63996	48.39832
4	-477.1581	118.0775*	23698087*	35.29324*	46.21574*	39.29677*
			NIGER			
0	-1060.757	NA	1.75e+12	50.89319	51.22417	51.01451
1	-851.6317	328.6255	1.84e+09	43.98246	46.96132	45.07433
2	-778.5593	86.99095	1.68e+09	43.55044	49.17718	45.61286
3	-688.8577	72.61552	1.42e+09	42.32656	50.60118	45.35953

4	-426.3345	112.5099*	2106916.*	32.87307*	43.79557*	36.87660*
			NIGERIA			
0	-1128.999	NA	4.51e+13	54.14283	54.47381	54.26415
1	-970.6036	248.9077	5.31e+11	49.64779	52.62665	50.73966
2	-900.2038	83.80928	5.50e+11	49.34304	54.96978	51.40546
3	-809.2565	73.62401	4.38e+11	48.05983	56.33445	51.09281
4	-599.2696	89.99436*	7.94e+09*	41.10808*	52.03057*	45.11160*
			SENEGAL			
0	-1032.142	NA	4.48e+11	49.53058	49.86157	49.65190
1	-814.5101	341.9933*	3.14e+08	42.21477	45.19363*	43.30664
2	-745.4748	82.18483	3.47e+08	41.97499	47.60173	44.03742
3	-658.0988	70.73300	3.27e+08	40.86185	49.13646	43.89482
4	-475.2418	78.36727	21631358*	35.20199*	46.12449	39.20552*
			TOGO			
0	-1200.181	NA	1.34e+15	57.53241	57.86339	57.65373
1	-1020.914	281.7041	5.83e+12	52.04354	55.02240	53.13541
2	-963.8283	67.95964	1.14e+13	52.37277	57.99951	54.43520
3	-873.9212	72.78191	9.52e+12	51.13910	59.41372	54.17208
4	-616.0232	110.5277*	1.76e+10*	41.90587*	52.82836*	45.90939*

Source: Author's Computation, 2018

* suggests lag order selected by the criterion (at 5% critical level).

The table above shows selection criteria. It can be observed that most criterion suggests the fourth lag as the best option in order to avoid errors in estimated results from other statistical tests. The AIC, which is the strongest criterion, also suggests that lag 4 is the best estimating the model for all the selected countries. Therefore, the remaining tests will be ran using four (4) lags

7.4 ARDL BOUNDS TEST RESULTS

The cointegration test specifies the possible information on the long-term equilibrium relations of the model. Two or more variables are said to be cointegrated when there exists a long-term relation between them. As aforementioned, the cointegration test was employed in order to answer the first research question (see section 1.5). In other words, this test is done to know the nature of relationship between GR and the independent variables (DBT, M3, PSC, GCF and TR). We use the Auto Regressive Distributed Lag (ARDL) Bound test of cointegration.

Table 7.4.1: ARDL Bound Test results for Benin

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	-0.008858	0.021308	-0.415708	0.6807
GCF	-0.076163	0.113638	-0.670226	0.5080
M3	-0.169812	0.081577	-2.081604	0.0463
PSC	0.024573	0.065503	0.375146	0.7103
TR	0.323598	0.078613	4.116320	0.0003
C	-7.862466	3.605026	-2.180973	0.0374
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	9.264918	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73

	1%	3.06	4.15

Source: Author's Computation, 2018

The coefficients from the table can be expressed in a model form as:

$$GR = -7.8625 - 0.0089DBT - 0.0762GCF - 0.1698M3 + 0.0246PSC + 0.3236TR$$

The table above shows the bound cointegration test results for the Republic of Benin. It can be seen that DBT, GCF, and M3 have a negative relationship with GR, whereas PSC and TR have a positive relationship with GR. The above model indicates that the growth rate of gross domestic product (GR) will be -7.86%, assuming all other independent variables are equal to zero. Also, a percentage increase in GR would result in a fall in the debt level (DBT) but not substantially in the long run; meanwhile gross capital formation (GCF) will fall by approximately 0.08% if there is a percentage change in GR in the long run; M3 will fall by approximately 0.17% if there is a percentage change in GR in the long run. On the other hand, PSC and TR will increase by 0.02% and 0.32% respectively if there is a percentage change in GR in the long run. However, the p-value shows that the coefficients of M3, TR and the constant are significant at 5% level in explaining the relationship with GR. While the coefficients of the other variables DBT, GCF and PSC are not significant in explaining their relationship with GR in the long run as indicated by their p-values.

Nevertheless, the null hypothesis for the bound cointegration test is that there is no long run relationship. Therefore, looking at the F-Bounds test, the value of the F-statistic is greater than the value of I(1), and so, we reject the null hypothesis. We can conclude that there is a long run relationship between the growth rate of gross domestic product (GR) and the independent variables.

Table 7.4.2: ARDL Bound Test results for Burkina Faso

Levels Equation Restricted Constant and No Trend				
Variable	0.052515	0.065922	0.796623	0.4373
DBT	0.155079	0.207162	0.748589	0.4650
GCF	-0.162011	0.230955	-0.701483	0.4931
M3	-0.228514	0.232531	-0.982725	0.3404
PSC	0.072131	0.048327	1.492542	0.1550
TR	3.092576	4.227036	0.731618	0.4750
C	0.052515	0.065922	0.796623	0.4373

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	3.938331	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Source: Author’s Computation, 2018

The coefficients results shown in the table can be expressed in the model form as

GR = 3.0926+ 0.0525DBT +0.1551GCF - 0.1620M3 - 0.2285PSC + 0.0721TR

We can observe from the model that DBT, GCF, and TR have a positive relationship with GR; while PSC and M3 have a negative relationship with GR. The model also shows that the growth rate of GDP will be approximately 3.09% in the long run, holding all other variables constant. Similarly, a percentage change in GR will result in a rise in debt by 0.05% approximately. Furthermore, GCF and TR rises by about 0.16% and 0.07% respectively, if there is a percentage change in GR in the long run, while M3 and PSC will fall by 0.16% and 0.12% respectively if there is a percentage change in GR in the long run. However, the p-value for the independent variables indicate that the coefficients are not significant at 5% level in explaining their relationship GR.

Furthermore, since the value of the F-statistic is not greater than all the values of the regressors I(1) at all levels of significance, we do not reject the null hypothesis. Therefore, we can conclude that there is no long run relationship between GR and the explanatory variables for Burkina Faso.

Table 7.4.3: ARDL Bound Test results for Cote D'Ivoire

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	-0.018358	0.013823	-1.328061	0.1949
GCF	0.252647	0.074459	3.393092	0.0021
M3	0.317554	0.142791	2.223914	0.0344
PSC	-0.144718	0.053574	-2.701276	0.0116
TR	-0.181264	0.066173	-2.739260	0.0106

C	9.289635	7.694832	1.207256	0.2374
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	2.894789	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Source: Author's Computation, 2018

The above table shows the coefficients and p-values of the bound test expressed as

GR = 9.2896 – 0.0184DBT + 0.2526GCF + 0.3176M3 - 0.1447PSC – 0.1813TR

The result shows that there is a negative relationship between DBT, PSC, TR and GR in the long run. GR has a positive relationship with GCF and M3 in the long run. GR will be approximately 9.29% in the long run, if the explanatory variables are equal to zero. A percentage change in GR will have a negative effect on DBT but not substantially (0.02%) in the long run. Similarly, a percentage change in GR will result in a fall in PSC by approximately 0.15% in the long run. Also, TR will fall by about 0.18% if there is a percentage change in GR in the long run. Conversely, GCF and M3 rises by 0.25% and 0.32% respectively in the long run when there is a percentage change in GR. However, the p-value also shows that the coefficients are significant at 5% level in explaining the long run relationship with the exception of DBT and the constant whose p-value is not significant.

The above table also shows the F-Bounds test for Cote D'Ivoire. The value of the F-statistic is greater than the value of I(1), and so, we do not reject the null hypothesis. We can conclude that there is a long run relationship between GR and the independent variables.

Table 7.4.4: ARDL Bound Test results for Ghana

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	-0.093449	0.040898	-2.284916	0.0293
GCF	0.368125	0.126006	2.921488	0.0064
M3	0.017367	0.248493	0.069889	0.9447
PSC	-0.628549	0.425039	-1.478804	0.1493
TR	0.067329	0.079187	0.850254	0.4017
C	3.391578	3.460330	0.980131	0.3346

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.580599	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Source: Author's Computation, 2018

We can express the coefficients in the above table in model form as

$$GR = 3.3916 - 0.0934DBT + 0.3681GCF + 0.0174M3 - 0.6285PSC + 0.0673TR$$

It can be seen from the table and model above that DBT, and PSC have an inverse relationship with GR while GCF, M3 and TR have a positive relationship. The estimation presented shows that holding DBT, M3, PSC and TR constant, GR is approximately 3.39% in the long run. Similarly, DBT falls by a fractional amount (0.09%) if there is a percentage change in GR. A percentage change in GR would also result in fall in PSC by approximately 0.63% in the long run. While GCF, M3 and TR will increase by about 0.37%, 0.02% and about 0.07% respectively if there is a percentage change in GR in the long run. However, P-values show that only DBT and GCF are significant at 5% level in explaining the long run equilibrium relationship with GR.

The above table also shows the F-bound test results for Ghana. The value of the F-statistic is greater than the values of I(1), and so, we reject the null hypothesis. Therefore, we can conclude that there is a long run relationship between GR and the independent variables.

Table 7.4.5: ARDL Bound Test results for Mali

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.024646	0.020630	1.194645	0.2403
GCF	-0.140012	0.436017	-0.321117	0.7500
M3	0.091115	0.106163	0.858252	0.3966
PSC	0.096011	0.225458	0.425850	0.6728
TR	0.088526	0.096721	0.915271	0.3663

C	-2.934464	9.419890	-0.311518	0.7573
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	11.84080	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Source: Author's Computation, 2018

The coefficients in the above table can be expressed in model form as

$$GR = -2.9345 - 0.0246DBT - 0.1400GCF + 0.0911M3 + 0.0960PSC + 0.0885TR$$

We can see from the results above that the independent variables have a positive relationship with GR with the exception of GCF. It is also estimated that GR will be -2.93% in the long run, holding the other independent variables constant. Likewise, a percentage change in GR results in a rise in DBT by approximately 0.03% in the long run, while GCF falls by 0.34% when there is a percentage change in GR. However, a percentage change in GR results in a rise in M3 and PSC by about 0.09% and 0.10% respectively in the long run. Meanwhile, TR will rise by 0.09% if GR rises by 1%. Nonetheless, looking at the p-values, the coefficients are not significant at 5% level in explaining the long run equilibrium relationship between the independent variables and GR.

Furthermore, the F-Bounds result shows that there is a long run relationship between GR and the independent variables since the value of the F-stat is greater than all the regressors (I(1).

Table 7.4.6: ARDL Bound Test results for Niger

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	-0.249876	0.059573	-4.194482	0.0012
GCF	-2.480977	0.549375	-4.516001	0.0007
M3	2.455736	0.480038	5.115712	0.0003
PSC	-2.943264	0.564858	-5.210628	0.0002
TR	1.808789	0.398639	4.537404	0.0007
C	-32.52510	8.078864	-4.025950	0.0017
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	9.603462	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Source: Author's Computation, 2018

The coefficients in the above table can be expressed in model form as

$$GR = -32.5251 - 0.2499DBT - 2.4810GCF + 2.4557M3 - 2.9433PSC + 1.8088TR$$

From the above results, we can see that broad money (M3) and Trade (TR) has a positive relationship with growth rate of gross domestic product (GR) in Niger, while external debt stock (DBT), gross capital formation (GCF) and domestic credit to the private sector (PSC) have a negative relationship with GR in the long run. It can be seen that GR falls by approximately 32.53% if all the independent variables are held constant in the long run. Similarly, a percentage change in GR causes Debt to fall by 0.25%. In the same vein, a percentage change in GR causes GCF and PSC to fall by about 2.48% and 2.94% respectively in the long run. However, a percentage change in M3 and TR will result in a rise in GR in the long run by approximately 2.45% and 1.81%. Looking at the p-values, all the coefficients are significant at 5% level in explaining the equilibrium relationship between the independent variables and GR in the long run.

Furthermore, the F-Bounds test shows that there is a long run relationship between GR and the independent variables as the F-statistic is greater than I(1).

Table 7.4.7: ARDL Bound Test results for Nigeria

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	-1.226220	0.641657	-1.911020	0.0730
GCF	-1.218136	0.419734	-2.902162	0.0099
M3	-0.364400	0.500863	-0.727545	0.4768
PSC	0.912886	0.301144	3.031391	0.0075
TR	0.032915	0.066183	0.497340	0.6253

C	16.34070	5.802112	2.816336	0.0119
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	3.091222	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Source: Author's Computation, 2018

The coefficients in the above table can be expressed in model form as

$$GR = 16.3407 - 1.2262DBT - 1.2181GCF - 0.3644M3 + 0.9129PSC + 0.0329TR$$

We can see from the above result that DBT, GCF, M3 have an inverse relationship with GR, while PSC and TR have a direct relationship with GR. The results also show that a unit change in GR leads to a fall in DBT by 1.23% in the long run. Likewise, a percentage change in GR leads to a fall in GCF, and M3 by about 1.22% and 0.36% in the long run. Whereas, a percentage change in GR results in an increase in PSC and TR by about 0.91% and 0.03% in the long run. GR will be 16.34% in the long run assuming the other independent variables are equal to zero. However, looking at the p-values, the coefficients of DBT, M3 and TR are not significant at 5% level in explaining the long run equilibrium relationship between the independent variables and GR for Nigeria.

Furthermore, the F-statistic shows that there is no relationship between GR and the independent variables in the long run because the value of the F-statistic is smaller than the values of I(1), and so, we do not reject the null hypothesis. The null hypothesis for the bound cointegration test is that there is no long run relationship.

Table 7.4.8: ARDL Bound Test results for Senegal

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	-0.000911	0.016333	-0.055771	0.9559
GCF	0.251400	0.057805	4.349090	0.0002
M3	-0.076677	0.052355	-1.464552	0.1546
PSC	-0.034663	0.027095	-1.279326	0.2117
TR	-0.073605	0.020551	-3.581499	0.0013
C	6.161118	2.274674	2.708572	0.0116
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.832788	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Source: Author’s Computation, 2018

The F-Bounds test here shows that there is a long run relationship between GR and the independent variables because the value of the F-statistic is greater than the values of I(1), therefore, we reject the null hypothesis.

The coefficients in the above table can be expressed in model form as

GR = 6.1611 – 0.0009DBT + 0.2514GCF - 0.0767M3 - 0.0347PSC - 0.0736TR

From the above estimation, we can see that nearly all independent variables have a negative relationship with GR, except GCF. GR will be 6.16% in the long run, assuming other independent variables and equal to zero. Also, a percentage change in GR results in a fall in DBT by a small amount in the long run, while a percentage change in GR leads to a 0.25% rise in GCF. On the other hand, a percentage change in GR results in a fall in M3, PSC and TR by about 0.07%, 0.03% and 0.07% respectively in the long run. However, looking at the p-values, the coefficients of GCF, TR and constant are significant at 5% level in explaining the long run equilibrium relationship between the independent variables and GR.

Table 7.4.9: ARDL Bound Test results for Togo

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.009639	0.017227	0.559553	0.5810
GCF	-0.249773	0.144982	-1.722783	0.0978
M3	-0.295470	0.155463	-1.900588	0.0694
PSC	0.531460	0.235439	2.257316	0.0334
TR	0.115245	0.064340	1.791201	0.0859
C	-5.259190	4.295430	-1.224369	0.2327
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)

F-statistic	5.396161	10%	2.08	3
K	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Source: Author's Computation, 2018

The coefficients in the above table can be expressed in model form as

$$GR = -5.2592 + 0.0096DBT - 0.2498GCF - 0.2955M3 + 0.5315PSC + 0.1152TR$$

From the above results, it can be observed that GCF and M3 have a negative relationship with GR, while DBT, PSC and TR have a positive relationship with GR. From the above estimation, GR falls by approximately 5.26% if the other independent variables are equal to zero. Also, a percentage change in GR results in a rise in DBT in the long run by about 0.01%. Furthermore, PSC and TR increase by 0.53% and 0.12% approximately, if there is a percentage change in GR. On the other hand, GCF and M3 declines by 0.24% and 0.30% approximately when there is a percentage change in GR in the long run. However, looking at the p-values, only the coefficient of PSC is significant at 5% level in explaining the long run equilibrium relationship between the independent variables and GR. Furthermore, the F-statistic shows that there is a long run relationship between the independent variables and GR because the value of the F-statistic is greater than the values of I(1), therefore, we reject the null hypothesis.

Table 7.4.10: **Summary of Cointegration tests**

Countries	Cointegrated relationship
Benin	Yes
Burkina Faso	No
Cote D'Ivoire	No
Ghana	Yes
Mali	Yes
Niger	Yes
Nigeria	No
Senegal	Yes
Togo	Yes

Since most of the countries have cointegrated relationships, meaning there is a long run relationship among the variables, we shall carry out Error Correction Regression for them to see the short run equilibrium dynamics among the variables.

7.5 ERROR CORRECTION MODEL

The error correction model (ECM) is sometimes referred to as the speed of adjustment test. It tells us the degree to which the equilibrium behaviour drives short run dynamics. The value of the error correction term is expected to be between 0 and 1, and is also expected to be negative, because a positive value would mean an ambiguous estimation. However, if the error correction term is negative and statistically significant but has a bigger value (i.e. more than 1), the result is also considered to be ambiguous.

Table 7.5.1: ECM results for Benin

ECM regression Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DBT)	-0.077584	0.035669	-2.175126	0.0379
D(DBT(-1))	-0.062545	0.036173	-1.729050	0.0944
D(DBT(-2))	-0.048422	0.036978	-1.309495	0.2006
D(GCF)	-0.213671	0.089530	-2.386570	0.0238
D(GCF(-1))	-0.396579	0.092269	-4.298064	0.0002
D(M3)	-0.075282	0.117709	-0.639566	0.5275
D(M3(-1))	0.371530	0.116427	3.191099	0.0034
CointEq(-1)*	-1.042474	0.117831	-8.847179	0.0000

R-Squared	0.810302	Mean Dependent Var	-0.100742
Adjusted R^2	0.772363	S.D dependent Var	4.380650
S.E of regression	2.090067	Akaike info criterion	4.478510
Sum squared Resid	152.8933	Swartz Criterion	4.806175
Log likelihood	-88.28797	Hannan-Quinn criter.	4.599343
Durbin Watson	1.752728		

Source: Author's Computation, 2018

The above result shows the ECM result for the republic of Benin. The error correction term in the table is denoted as CointEq(-1). The error correction term carries the expected sign. The coefficient for the error correction term is -1.04, reflecting that there is a quick speed of adjustment. It can also be seen that the P-value of the error term is less than 0.05, therefore, we can say that the coefficient is significant at 5% level. Furthermore, the R-squared result indicates that the error correction model can explain 81.03% of the relationship among the variables. However, since the coefficient is greater than 1, we can say that the result is ambiguous in explaining the short-run dynamic of the model.

Table 7.5.2: ECM results for Ghana

ECM regression Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PSC)	-0.218573	0.353258	-0.618735	0.5406
D(PSC(-1))	0.544490	0.330279	1.648579	0.1093
D(PSC(-2))	1.064086	0.325404	3.270041	0.0026
D(PSC(-3))	1.444116	0.324369	4.452076	0.0001
CointEq(-1)*	-0.939801	0.137634	-6.828251	0.0000

R-squared	0.598474	Mean dependent var	0.024555
Adjusted R-squared	0.555066	S.D. dependent var	5.026908
S.E. of regression	3.353117	Akaike info criterion	5.369001
Sum squared resid	416.0055	Schwarz criterion	5.575866
Log likelihood	-107.7490	Hannan-Quinn criter.	5.444825
Durbin-Watson stat	2.160088		

Source: Author’s Computation, 2018

The above table shows the ARDL error correction regression result for Ghana. The error correction term in the model is CointEq(-1) and it is estimated as -0.94. It infers that 94% of short run disequilibrium is corrected in that period. It has the expected negative sign and the p-value suggests that the coefficient is significant at

5% level. Furthermore, the r-squared shows that the error correction model can only explain 59.84% of relationships among the variables.

Table 7.5.3: ECM results for Mali

ECM regression Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DBT)	-0.146656	0.070093	-2.092299	0.0437
D(PSC)	-0.417403	0.247344	-1.687543	0.1004
D(TR)	-0.121863	0.117888	-1.033712	0.3084
CointEq(-1)*	-1.266562	0.128537	-9.853655	0.0000

R-squared	0.714161	Mean dependent var	-0.003875
Adjusted R-squared	0.693246	S.D. dependent var	8.134562
S.E. of regression	4.505357	Akaike info criterion	5.933099
Sum squared resid	832.2280	Schwarz criterion	6.093691
Log likelihood	-129.4947	Hannan-Quinn criter.	5.992966
Durbin-Watson stat	2.186752		

Source: Author’s Computation, 2018

The above table shows the ECM for Mali. It can be observed from the table above that the error correction term carries the expected negative sign and is statistically significant at 5% level. The estimated error correction term is -1.27 and implies that there is a substantial speed of adjustment of disequilibrium correction within the period. In addition, the r-squared shows that the error correction model can only explain 71.41% of the relationships among the variables. Furthermore, we can see that the error correction term is greater than 1. This infers that the result is ambiguous in explaining the short-run equilibrium dynamic of the model.

Table 7.5.4: ECM results for Niger

ECM regression Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	-0.310223	0.087987	-3.525773	0.0042
D(GR(-2))	-0.413794	0.075895	-5.452157	0.0001
D(GR(-3))	-0.438181	0.064286	-6.816101	0.0000
D(DBT)	-0.115054	0.036361	-3.164236	0.0082
D(DBT(-1))	0.348011	0.041245	8.437762	0.0000
D(DBT(-2))	0.136022	0.040442	3.363390	0.0056
D(DBT(-3))	0.075868	0.041154	1.843497	0.0901
D(GCF)	-0.179480	0.187675	-0.956336	0.3578
D(GCF(-1))	2.567841	0.267979	9.582253	0.0000
D(GCF(-2))	1.899351	0.275284	6.899599	0.0000
D(GCF(-3))	1.264479	0.187424	6.746606	0.0000
D(M3)	0.579787	0.273438	2.120358	0.0555
D(M3(-1))	-0.452078	0.318528	-1.419273	0.1813
D(M3(-2))	0.371959	0.283994	1.309745	0.2148
D(M3(-3))	0.854202	0.242906	3.516591	0.0043
D(PSC)	-0.329075	0.312965	-1.051477	0.3138
D(PSC(-1))	1.259736	0.377029	3.341221	0.0059
D(PSC(-2))	1.888627	0.416294	4.536767	0.0007

D(PSC(-3))	0.839615	0.367793	2.282849	0.0415
D(TR)	-0.038018	0.086515	-0.439437	0.6682
D(TR(-1))	-1.928891	0.217941	-8.850519	0.0000
D(TR(-2))	-1.486888	0.211596	-7.027016	0.0000
D(TR(-3))	-0.607147	0.149800	-4.053041	0.0016
CointEq(-1)*	-1.250362	0.124517	-10.04173	0.0000

R-squared	0.974674	Mean dependent var	0.491735
Adjusted R-squared	0.942312	S.D. dependent var	8.342766
S.E. of regression	2.003784	Akaike info criterion	4.523512
Sum squared resid	72.27273	Schwarz criterion	5.516466
Log likelihood	-70.99374	Hannan-Quinn criter.	4.887468
Durbin-Watson stat	2.761372		

Source: Author's Computation, 2018

The above result shows the ECM result for Niger. The error correction term in the table is indicated as CointEq(-1). The error correction term carries the expected negative sign and is statistically significant at 5% level as signified by the p-value. The coefficient for the error correction term is -1.25, which is ambiguous in explaining the dynamics in the short run. Additionally, the R-squared result indicates that the error correction model can explain 97.46% of the relationship among the variables.

Table 7.5.5: ECM results for Senegal

ECM regression Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	0.846245	0.247156	3.423932	0.0020
D(GR(-2))	0.519558	0.191413	2.714332	0.0114
D(GR(-3))	0.212666	0.110174	1.930269	0.0641
D(DBT)	-0.072717	0.038874	-1.870588	0.0723
D(GCF)	0.329173	0.118813	2.770507	0.0100
D(M3)	0.166924	0.185996	0.897458	0.3774
D(M3(-1))	0.628418	0.197031	3.189429	0.0036
D(PSC)	-0.565774	0.151010	-3.746606	0.0009
CointEq(-1)*	-2.181144	0.308761	-7.064187	0.0000

R-squared	0.850977	Mean dependent var	0.287344
Adjusted R-squared	0.814850	S.D. dependent var	5.101911
S.E. of regression	2.195305	Akaike info criterion	4.597928
Sum squared resid	159.0390	Schwarz criterion	4.970286
Log likelihood	-87.55649	Hannan-Quinn criter.	4.734412
Durbin-Watson stat	2.141615		

Source: Author’s Computation, 2018

The above table shows the ARDL error correction regression results for Senegal. The error correction term in the model is CointEq(-1) and is calculated approximately as -2.18. This result is ambiguous even though it carries the expected negative sign. The p-value also suggests that the coefficient is significant at 5% level. Furthermore, the r-squared shows that the error correction model can only explain 85.10% of the relationships among the variables.

Table 7.5.6: ECM results for Togo

ECM regression Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	0.198060	0.181080	1.093770	0.2849
D(GR (-2))	0.282540	0.156612	1.804073	0.0838
D(GR(-3))	0.325018	0.109704	2.962685	0.0068
D(DBT)	-0.157188	0.044908	-3.500220	0.0018
D(GCF)	0.126046	0.125261	1.006265	0.3243
D(GCF(-1))	0.156203	0.116332	1.342738	0.1919
D(GCF(-2))	0.488813	0.129202	3.783318	0.0009
D(M3)	0.128073	0.217043	0.590079	0.5607
D(PSC)	-0.271364	0.208676	-1.300412	0.2058
D(PSC(-1))	-0.362390	0.195652	-1.852217	0.0763
D(TR)	0.336895	0.064735	5.204195	0.0000
CointEq(-1)*	-1.476968	0.214944	-6.871420	0.0000

R-squared	0.846407	Mean dependent var	0.036391
Adjusted R-squared	0.790090	S.D. dependent var	8.260744
S.E. of regression	3.784740	Akaike info criterion	5.734788
Sum squared resid	429.7277	Schwarz criterion	6.231265
Log likelihood	-108.4305	Hannan-Quinn criter.	5.916766
Durbin-Watson stat	2.242359		

Source: Author’s Computation, 2018

The above table shows the ARDL error correction regression result for Togo. The error correction term in the model is -1.47. The result is ambiguous as the coefficient of the EC term is greater than 1. It has the expected negative sign and the p-value suggests that the coefficient is significant at 5% level. Furthermore, the r-squared shows that the error correction model can only explain 84.64% of the relationships among the variables.

Table 7.5.7: **Summary of ARDL Error Correction Regression**

Countries	Error Correction term (CointEq(-1)	P-Value
Benin	-1.042474	0.000
Burkina Faso	N/A	N/A
Cote D'Ivoire	N/A	N/A
Ghana	-0.939801	0.0000
Mali	-1.266562	0.0000
Niger	-1.250362	0.0000
Nigeria	N/A	N/A
Senegal	-2.181144	0.0000
Togo	-1.476968	0.0000

Source: Author's Computation, 2018

The table above displays the summary of the ECM. It can be seen that even though the P-value indicates significance, and the coefficients carry the expected sign, the results were ambiguous. However, the coefficient for Mali was significant, carry the expected sign and indicates that about 93.98% of the errors in the short run are corrected within the same period. It could also be observed that there were no estimated coefficients for Burkina Faso, Cote D'Ivoire and Nigeria, because there was no cointegration detected among the variables tested for those countries.

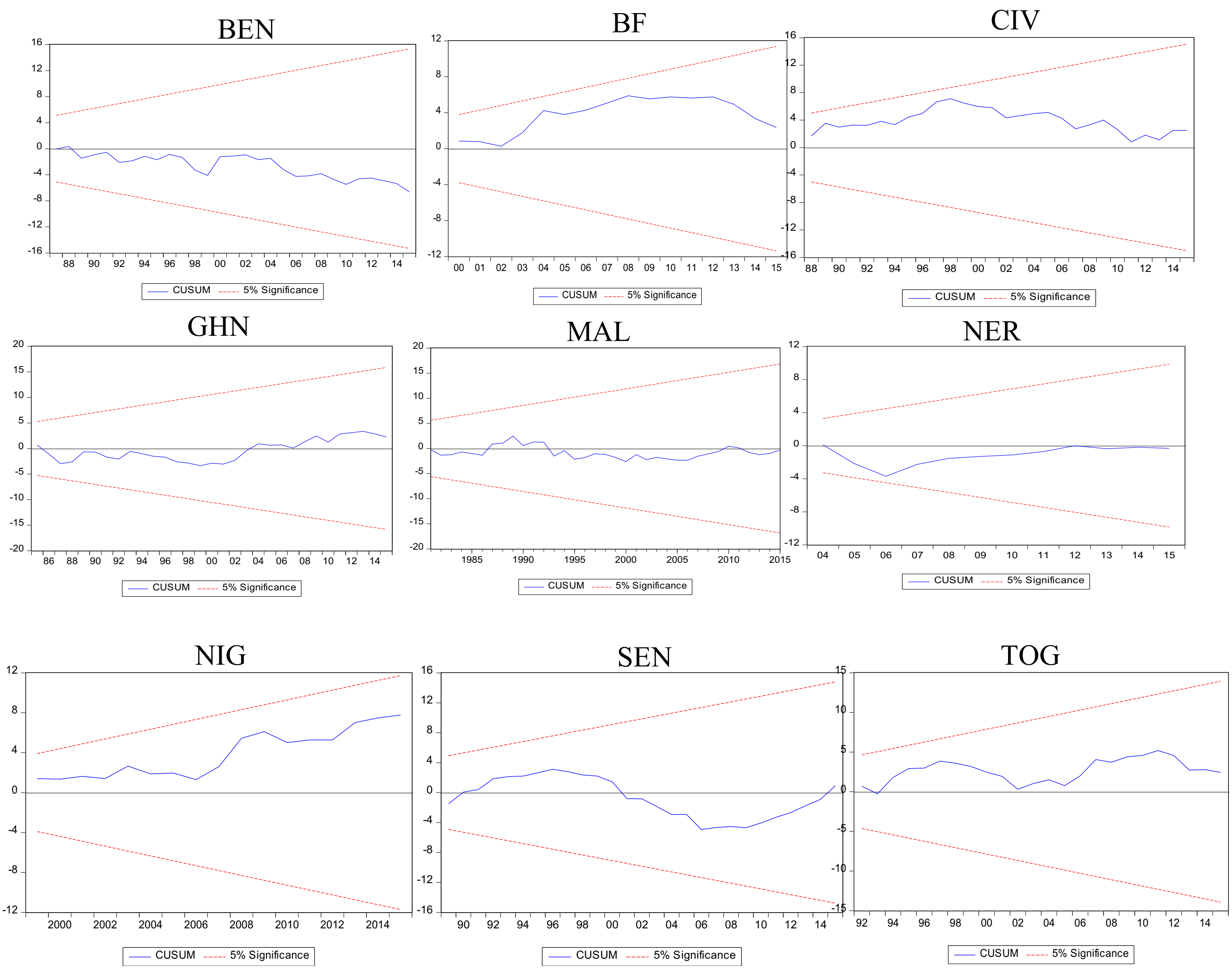
7.6 POST DIAGNOSTIC TESTS

The effects of a mis-specified model in econometric analysis can be dangerous in most cases. A mis-specified model has unfavourable consequences on the sampling peculiarities of both estimators and tests. Therefore, post diagnostic tests are done to check how the error term is distributed, and the likely estimation errors or the model's structural specification.

7.6.1 Cumulative Sum Test

The cumulative sum test also known as the CUSUM test is done to check the stability of the coefficients of the model. The plot of the CUSUM is expected to be within the level of significance, usually 5% (depicted by the two red lines). If this is the case, then the coefficients of the model are said to be stable. However, if the plot of the CUSUM falls outside the significance lines, then the coefficients of the model are not stable.

Figure 7.1: CUSUM Test Result



Source: Author’s computation, 2018

It can be seen from Graph 7.6.1 that the trend of the cumulative sum (blue line) is within the 5% significance level, therefore we can say that our model is stable for every country tested.

So far, we can see from the initial set of test results that there are long run relationships between the independent variables (DBT, GCF, M3, PSC and TR) and the dependent variable (GR) among the selected West African countries apart from

Burkina Faso, Cote D'Ivoire and Nigeria. Furthermore, we could observe from the Error Correction Regression results, that the coefficients had the expected negative signs but were too ambiguous in explaining the short run equilibrium dynamics among the variables in the selected West African countries. Therefore, it is important to do a more robust test by adding more explanatory variables to see if the results will improve.

7.7 ROBUSTNESS TESTS

A robustness test is done when a researcher wants to assess how key regression coefficient estimates change when the regression specification is altered either by adding or taking away regressors (Lu and White, 2014). In this case, we added two more explanatory variables, inflation (IN) and government spending (PX). Inflation is added as a monetary policy instrument and government spending is added as a fiscal policy instrument. Therefore, this expanded model still examines the first research question (see section 1.5). The new robust model is expressed below as

$$GR = \beta_0 + \beta_1 DBT + \beta_2 GCF + \beta_3 PSC + \beta_4 M3 + \beta_5 TR + \beta_6 IN + \beta_7 PX + \varepsilon$$

Where: GR = is the annual growth rate of GDP.

DBT = External debt stock.

GCF = Gross Capital formation (% of GDP)

PSC = Private sector credit (% of GDP)

M3 = broad money (% of GDP).

TR = Trade (% of GDP).

IN = Inflation

PX = government spending (% of GDP)

7.7.1 **Robust Unit root test**

Table 7.7.1: Robust Unit root results at first difference

Series	BEN	BF	CIV	GHN	MAL	NER	NGR	SEN	TOGO
D(GR)	0.0001	0.0001	0.0000	0.0000	0.0001	0.0001	0.0000	0.0001	0.0001
D(DBT)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D(GCF)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000
D(M3)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D(PSC)	0.0000	0.0004	0.0004	0.0000	0.0000	0.0001	0.0000	0.0001	0.0000
D(TR)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D(IN)	0.0001	0.0001	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000
D(PX)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Source: Author's computation, 2018

The above unit root test was done at first difference. The null hypothesis for the unit root test is that there is presence of unit root. Since the p-values are less than 0.05 as shown above, we can reject the null hypothesis at 5% level of significance and say that that there is no presence of unit root.

7.7.2 **Robust ARDL Bounds Test Results**

Table 7.7.2: ARDL Bound Test results for Benin

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.053182	0.011757	4.523586	0.0106
GCF	-1.284490	0.189815	-6.767051	0.0025
M3	0.497281	0.050041	9.937414	0.0006

PSC	-1.014710	0.110745	-9.162577	0.0008
TR	0.402220	0.083068	4.842072	0.0084
IN	-0.445539	0.119136	-3.739750	0.0201
PX	1.256376	0.114249	10.99684	0.0004
C	-131.5169	10.88425	-12.08323	0.0003
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	8.573311	10%	1.92	2.89
K	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Source: Author's Computation, 2018

GR = -131.5169 + 0.0532DBT – 1.2845GCF + 0.4973M3 – 1.0147PSC + 0.4022TR - 0.4455IN + 1.2564PX

The table above shows the robust bound cointegration test results for Benin. It can be seen that DBT, M3, TR and PX have a positive relationship with GR, whereas GCF, M3 and IN have a negative relationship with GR. The above model indicates that the growth rate of gross domestic product (GR) will be -131.51 approximately, assuming all other independent variables are equal to zero. Also, a percentage change in GR will raise the debt level by about 0.05% in the long run. Meanwhile, M3 will rise by approximately 0.50% if there is a percentage change in GR in the long run; TR and PX will increase by 0.40% and 1.25% respectively if there is a percentage change in GR in the long run.

On the other hand, GCF, PSC and IN will fall by 1.28%, 1.02%, and 0.45% respectively if there is a percentage change in GR in the long run. However, looking at all the p-values for the coefficients, we can see that they are less than 0.05, meaning that they are significant in explaining the relationship between the explanatory variables and GR in the long run at 5% level of significance.

As previously mentioned, the null hypothesis for the bound cointegration test is that there is no long run relationship. Hence, it can be observed that the value of the F-statistic is greater than the values of I(1), and so, we reject the null hypothesis. We can conclude that there is a long run relationship between growth rate of gross domestic product (GR) and the independent variables.

Table 7.7.3: ARDL Bound Test results for Burkina Faso

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.009158	0.061121	0.149833	0.8881
GCF	0.091100	0.122532	0.743481	0.4985
M3	0.380235	0.250978	1.515009	0.2043
PSC	-0.113606	0.114902	-0.988723	0.3788
TR	-0.195057	0.061146	-3.190004	0.0332
IN	-0.031667	0.072476	-0.436932	0.6847
PX	0.416762	0.106150	3.926180	0.0172
C	-44.16677	11.90018	-3.711437	0.0206

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	6.112519	10%	1.92	2.89
K	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Source: Author's Computation, 2018

GR = -44.1668 + 0.0092DBT + 0.0911GCF + 0.3802M3 - 0.1136PSC – 0.1951TR - 0.0317IN + 0.4168PX

The table above shows the robust bound cointegration test results for Burkina Faso. According to the results, DBT, GCF, M3, and PX have a positive relationship with GR, whereas PSC, TR, and IN have a negative relationship with GR. We can see from the above model that the growth rate of gross domestic product (GR) is -44.17% approximately, if all other independent variables are equal to zero. Also, a percentage change in GR will raise the debt level by a little amount in the long run. Meanwhile, GCF will rise by approximately 0.09% if there is a percentage change in GR in the long run. M3 and PX will also increase by 0.38% and 0.42% respectively if there is a percentage change in GR in the long run.

On the other hand, PSC, TR and IN and will fall by 0.11%, 0.20% and 0.03% respectively if there is a percentage change in GR in the long run. However, looking at the p-values for TR and PX, we can see that they are less than 0.05, meaning that they are significant in explaining the relationship between the explanatory variables and GR in the long run at 5% level of significance. However, the p-values for DBT, GCF, M3, PSC and IN are greater than 0.05, meaning that they are not significant at 5% level to explain the relationship between those variables and GR.

The above table also shows the F-Bounds test. The null hypothesis for the bound cointegration test is that there is no long run relationship. The estimated value of the F-statistic is greater than the values of I(1), and so, we reject the null hypothesis. We can conclude that there is a long run relationship between the growth rate of gross domestic product (GR) and the independent variables.

Table 7.7.4: ARDL Bound Test results for Cote D'Ivoire

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.088323	0.075375	1.171788	0.2684
GCF	1.845492	1.114771	1.655489	0.0288
M3	1.091722	0.542016	2.014189	0.0717
PSC	-0.447589	0.275649	-1.623764	0.0355
TR	0.023996	0.192286	0.124792	0.9032
IN	-0.553490	0.502540	-1.101384	0.2965
PX	-1.165247	0.682289	-1.707849	0.0185
C	57.36776	29.78421	1.926113	0.0830
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.970873	10%	1.92	2.89

K	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Source: Author's Computation, 2018

GR = 57.3678 + 0.0883DBT + 1.8455GCF + 1.0917M3 – 0.4476PSC + 0.0240TR - 0.5535IN – 1.1652PX

We can see from the above table that PSC, IN, and PX have an inverse relationship with GR, while DBT, GCF, M3 and TR have a direct relationship with GR. The results also show that a percentage change in GR leads to a rise in DBT by 0.09% in the long run, whereas, a percentage change in GR results in an increase in GCF, M3 and TR by about 1.85%, 1.09% and 0.02% respectively in the long run. Furthermore, a percentage change in GR leads to a fall in PSC, IN and PX by about 0.45%, 0.55% and 1.17% in the long run respectively. GR will be 57.37% in the long run assuming the other independent variables are equal to zero. However, looking at the p-values, the coefficients of DBT, M3, TR and IN are not significant at 5% level in explaining the long run equilibrium relationship between the independent variables and GR for Cote D'Ivoire.

Furthermore, the F-statistic shows that there is a relationship between GR and the independent variables in the long run because the value of the F-statistic is greater than the values of I(1), and so, we reject the null hypothesis. The null hypothesis for the bound cointegration test is that there is no long run relationship.

Table 7.7.5: ARDL Bound Test results for Ghana

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.029852	0.103810	0.287567	0.7924
GCF	1.484177	0.858589	1.728624	0.1823
M3	-1.287947	0.503972	-2.555591	0.0835
PSC	3.238398	1.520544	2.129763	0.1230
TR	-0.360324	0.327742	-1.099414	0.3519
IN	1.221462	0.639060	1.911341	0.1519
PX	0.073303	0.492021	0.148984	0.8910
C	-49.44268	36.52554	-1.353647	0.2688

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	18.94189	10%	1.92	2.89
K	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Source: Author's Computation, 2018

GR = -49.4427 + 0.0299DBT + 1.4842GCF – 1.2879M3 + 3.2384PSC – 0.3603TR + 1.2215IN + 00733PX

From the above results, it can be observed that M3 and TR have a negative relationship GR, while DBT, GCF, PSC, IN and PX have a positive relationship with GR. From the above estimation, GR is -49.44 if the other independent variables are equal to zero. Also, a percentage change in GR results in a rise in DBT in the long run by about 0.03%. Furthermore, GCF, PSC, IN and PX increases by 1.48%, 3.24%, 1.22% and 0.07% approximately, if there is a percentage change in GR. On the other hand, M3 and TR declines by 1.29% and 0.36% approximately when there is a percentage change in GR in the long run. However, the p-values for the independent variables, it can be concluded that none of the coefficients are significant at 5% level in explaining the long run relationship with GR.

Furthermore, the F-statistic shows that there is a long run relationship between the independent variables and GR because the estimated value of the F-statistic is greater than the values of I(1), therefore, we reject the null hypothesis at 5% level of significance.

Table 7.7.6: ARDL Bound Test results for Mali

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.080051	0.050717	1.578402	0.2126
GCF	2.754410	0.945895	2.911961	0.0619
M3	-0.720238	0.451958	-1.593597	0.2093
PSC	2.055492	0.728587	2.821205	0.0667
TR	0.538658	0.164528	3.273967	0.0466
IN	0.094251	0.225729	0.417541	0.7044
PX	0.548992	0.434853	1.262478	0.2960
C	-158.3940	75.67446	-2.093097	0.1274

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	38.75450	10%	1.92	2.89
K	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Source: Author's Computation, 2018

GR = -158.3940 + 0.0801DBT + 2.7544GCF – 0.7202M3 + 2.0555PSC + 0.5387TR + 0.0943IN+ 0.5490PX

The table above shows the robust bound cointegration test results for Mali. It can be seen that DBT, GCF, PSC, TR and PX have a positive relationship with GR, whereas M3 has a negative relationship with GR. The above model indicates that the growth rate of gross domestic product (GR) will be -158.39 approximately, assuming all other independent variables are equal to zero. Also, a percentage change in GR will raise the debt level by about 0.08% in the long run. Meanwhile, GCF will rise by approximately 2.75% if there is a percentage change in GR in the long run; PSC will also rise by 2.055% if there is a percentage change in GR in the long run; TR, IN and PX will increase by 0.54%, 0.09% and 0.55% respectively if there is a percentage change in GR in the long run.

On the other hand, M3 will fall by 0.72% respectively if there is a percentage change in GR in the long run. However, looking at the p-value, we can see that only the p-value of TR is less than 0.05, meaning it is significant in explaining the relationship between the explanatory variables and GR in the long run at 5% level of significance. However, the p-value of the others are not significant in explaining the relationship among the variables.

Furthermore, the table also shows the F-statistic test and the null hypothesis for the bound cointegration test is that there is no long run relationship. Looking at the F-Bounds test, the value of the F-statistic is greater than the values of I(1), and so, we reject the null hypothesis. We can conclude that there is a long run relationship between the growth rate of gross domestic product (GR) and the independent variables.

Table 7.7.7: ARDL Bound Test results for Niger

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	-0.715879	0.376734	-1.900222	0.1978
GCF	-3.992779	2.988837	-1.335897	0.3133
M3	7.233526	3.792501	1.907323	0.1967
PSC	-9.622685	4.593036	-2.095060	0.1712
TR	4.614446	2.394270	1.927287	0.1938
IN	2.092405	0.965922	2.166226	0.1626
PX	-4.585675	1.546973	-2.964289	0.0975
C	377.0561	125.6746	3.000257	0.0955
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)

F-statistic	11.65587	10%	1.92	2.89
K	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Source: Author's Computation, 2018

$$GR = 377.0561 - 0.7159DBT - 3.9928GCF + 7.2335M3 - 9.6227PSC + 4.6144TR + 2.0924IN - 4.5857PX$$

We can see from the above table that DBT, GCF, PSC and PX have an inverse relationship with GR, while M3, TR and IN have a direct relationship with GR. The results also show that a percentage change in GR leads to a rise in M3 by 7.23% in the long run, whereas, a percentage change in GR results in an increase in TR and IN by about 4.61% and 2.09% respectively in the long run.

Conversely, a percentage change in GR leads to a fall in DBT, GCF, PSC and PX by about 0.72%, 3.99%, 9.66% and 4.59% in the long run respectively. GR will be 377.06% in the long run assuming the other independent variables are equal to zero. However, looking at the p-values, none are significant at 5% level in explaining the long run equilibrium relationship between the independent variables and GR for Niger.

Furthermore, the F-statistic shows that there is a relationship between GR and the independent variables in the long run because the value of the F-statistic is greater than the values of I(1), and so, we reject the null hypothesis. The null hypothesis for the bound cointegration test is that there is no long run relationship.

Table 7.7.8: ARDL Bound Test results for Nigeria

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	14.92129	143.5214	0.103966	0.0206
GCF	5.766356	59.38229	0.097106	0.0658
M3	3.033702	31.03363	0.097755	0.9253
PSC	-1.660177	21.00751	-0.079028	0.0796
TR	3.855544	34.80959	0.110761	0.0154
IN	-1.831616	17.26435	-0.106092	0.0090
PX	11.73209	106.5138	0.110146	0.0259
C	-1415.212	12963.18	-0.109172	0.9166
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	13.139398	10%	1.92	2.89
K	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Source: Author's Computation, 2018

GR = -1415.2122 + 14.9213DBT + 5.7664GCF + 3.0337M3 – 1.6602PSC + 3.8555TR – 1.8316IN +11.7321PX

The table above shows the robust bound cointegration test results for Nigeria. It can be seen that DBT, GCF, M3, TR and PX have a positive relationship with GR, whereas PSC and IN have a negative relationship with GR. The above model indicates that the growth rate of gross domestic product (GR) will be -1415.22 approximately, assuming all other independent variables are equal to zero. Also, a percentage change in GR will raise the debt level by about 14.92% in the long run. Meanwhile, GCF will rise by approximately 5.77% if there is a percentage change in GR in the long run; M3 will also rise by 3.033% if there is a percentage change in GR in the long run; while TR and PX will increase by 3.86% and 11.73% respectively if there is a percentage change in GR in the long run.

On the other hand, PSC and IN will fall by about 1.66% and 1.83 respectively if there is a percentage change in GR in the long run. However, looking at the p-value, we can see that only the p-value of DBT, TR, IN and PX are less than 0.05, meaning means it is significant in explaining the relationship between the explanatory variables and GR in the long run at 5% level of significance. However, the p-value of the others are not significant in explaining the relationship among the variables.

Furthermore, the table also shows the F-statistic test and the null hypothesis for the bound cointegration test is that there is no long run relationship. Looking at the F-Bounds test, the value of the F-statistic is greater than the values of I(1), and so, we reject the null hypothesis. We can conclude that there is a long run relationship between growth rate of gross domestic product (GR) and the independent variables.

Table 7.7.9: ARDL Bound Test results for Senegal

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.009141	0.067732	0.134962	0.0092
GCF	1.270065	0.928558	1.367782	0.2432
M3	0.144597	0.119872	1.206260	0.2942
PSC	0.099789	0.152969	0.652344	0.0498
TR	-0.504895	0.320276	-1.576440	0.1901
IN	0.260266	0.115036	2.262486	0.0864
PX	-0.797205	0.800942	-0.995334	0.0009
C	93.83043	90.88820	1.032372	0.3602

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	4.919159	10%	1.92	2.89
K	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Source: Author's Computation, 2018

GR = 93.8304 + 0.0091DBT + 1.2701GCF + 0.1446M3 + 0.0998PSC – 0.5049TR + 0.2603IN - 0.7972PX

We can see from the above table that DBT, GCF, M3, and IN have a positive relationship with GR, while TR and PX have a negative relationship with GR. The result also shows that a percentage change in GR leads to a rise in DBT by 0.09%

in the long run, whereas, a percentage change in GR results in an increase in GCF by 1.27%; M3 by 0.14%; PSC by 0.99; and IN by about 0.26% respectively in the long run.

Conversely, a percentage change in GR leads to a fall in TR and PX by about 0.50% and 0.79% in the long run respectively. GR will be 93.83 in the long run assuming the other independent variables are equal to zero. However, looking at the p-values, only DBT, PSC and PX are significant at the 5% level in explaining the long run equilibrium relationship between the independent variables and GR for Senegal.

Furthermore, the F-statistic shows that there is a relationship between GR and the independent variables in the long run because the value of the F-statistic is greater than the values of I(1), and so, we reject the null hypothesis.

Table 7.7.10: ARDL Bound Test results for Togo

Levels Equation Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.020084	0.026639	0.753938	0.5057
GCF	-1.104637	0.574952	-1.921267	0.1505
M3	-0.665956	0.591912	-1.125094	0.3424
PSC	0.884407	0.659362	1.341306	0.2723
TR	0.410196	0.231305	1.773398	0.1743
IN	1.212830	0.555696	2.182543	0.1171
PX	0.364877	0.243536	1.498244	0.2310

C	-58.47939	35.81755	-1.632702	0.2010
F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	18.26875	10%	1.92	2.89
K	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Source: Author's Computation, 2018

GR = -58.4794 + 0.0201DBT - 1.1046GCF - 0.6660M3 + 0.8833PSC + 0.4102TR + 1.2128 + 0.3649PX

We can see from the above table that DBT, PSC, TR, IN and PX have a positive relationship with GR, while GCF and M3 have an inverse relationship with GR. The results also show that a percentage change in GR leads to a fall in GCF by 1.11% in the long run. Also, a percentage change in GR results in a decrease in M3 by about 0.67% respectively in the long run.

Conversely, a percentage change in GR leads to a rise in DBT, PSC, TR, IN and PX by about 0.02%, 0.88%, 0.41%, 1.21% and 0.36% in the long run respectively. GR will be -58.48% in the long run assuming the other independent variables are equal to zero. However, looking at the p-values, none are significant at the 5% level in explaining the long run equilibrium relationship between the independent variables and GR for Togo.

Furthermore, the F-statistic shows that there is a relationship between GR and the independent variables in the long run because the value of the F-statistic is greater than the values of I(1), and so, we reject the null hypothesis.

Table 7.7.11 **Summary of Robust Cointegration tests**

Countries	Cointegrated relationship
Benin	Yes
Burkina Faso	Yes
Cote D'Ivoire	Yes
Ghana	Yes
Mali	Yes
Niger	Yes
Nigeria	Yes
Senegal	Yes
Togo	Yes

Since most of the countries have cointegrated relationships, meaning there is a long run relationship among the variables, we shall carry out Error Correction Regression for them to see the short run equilibrium dynamics among the variables.

7.7.3 Robust Error Correction Model

Table 7.8.1: ECM results for Benin

ECM regression

Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.

D(GR(-1))	2.975314	0.359287	8.281152	0.0012
D(GR(-2))	1.818490	0.232008	7.838047	0.0014
D(GR(-3))	1.165084	0.165316	7.047598	0.0021
D(DBT)	0.259672	0.050354	5.156971	0.0067
D(DBT(-1))	-0.430934	0.050592	-8.517827	0.0010
D(DBT(-2))	0.182159	0.022528	8.086026	0.0013
D(DBT(-3))	0.277124	0.025901	10.69943	0.0004
D(GCF)	-0.926266	0.086585	-10.69777	0.0004
D(GCF(-1))	4.265497	0.504569	8.453744	0.0011
D(GCF(-2))	2.205636	0.253757	8.691936	0.0010
D(GCF(-3))	0.613436	0.141530	4.334304	0.0123
D(M3)	1.752272	0.201886	8.679523	0.0010
D(M3(-1))	-0.743088	0.141294	-5.259168	0.0063
D(M3(-2))	0.335783	0.091828	3.656666	0.0216
D(M3(-3))	-0.847894	0.149660	-5.665473	0.0048
D(PSC)	-1.202990	0.185926	-6.470261	0.0029
D(PSC(-1))	5.704870	0.619991	9.201532	0.0008
D(PSC(-2))	4.254223	0.462950	9.189371	0.0008
D(PSC(-3))	2.773492	0.363511	7.629734	0.0016
D(TR)	0.830883	0.055777	14.89641	0.0001
D(TR(-1))	-0.105132	0.070247	-1.496611	0.2088
D(IN)	-1.291195	0.121705	-10.60925	0.0004
D(IN(-1))	1.038001	0.132804	7.816038	0.0014
D(IN(-2))	-0.031370	0.037511	-0.836278	0.4500
D(IN(-3))	-0.183264	0.035702	-5.133140	0.0068

D(PX)	-0.350455	0.087322	-4.013374	0.0160
D(PX(-1))	-5.585031	0.610526	-9.147905	0.0008
D(PX(-2))	-3.404717	0.422333	-8.061682	0.0013
D(PX(-3))	-1.280778	0.205157	-6.242913	0.0034
CointEq(-1)*	-0.821259	0.592652	-9.822392	0.0000

R-squared	0.989611	Mean dependent var	-0.038374
Adjusted R-squared	0.964504	S.D. dependent var	4.414386
S.E. of regression	0.831683	Akaike info criterion	2.645078
Sum squared resid	8.300366	Schwarz criterion	3.886271
Log likelihood	-25.54665	Hannan-Quinn criter.	3.100025
Durbin-Watson stat	3.216926		

Source: Author's Computation, 2018

The above result shows the robust Error Correction Model result (ECM) for Benin. The error correction term in the table is indicated as CointEq(-1). The error correction term carries the expected negative sign and is statistically significant at 5% level as signified by the p-value. The coefficient for the error correction term infers that about 82.13% of the disequilibrium in the short run are corrected within that period. This result is in line with the recovery policy of the BCEAO where they provide urgent funds in situations of financial instability (see section 4.3).

Additionally, the R-squared result indicates that the error correction model can explain 98.96% of the relationship among the variables.

Table 7.8.2: ECM results for Burkina Faso

ECM regression Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	2.033457	0.224849	9.043640	0.0008
D(GR(-2))	1.163573	0.159155	7.310938	0.0019
D(GR(-3))	0.444420	0.078720	5.645559	0.0048
D(DBT)	-0.182594	0.046055	-3.964728	0.0166
D(DBT(-1))	0.185341	0.050010	3.706059	0.0207
D(DBT(-2))	-0.123933	0.074834	-1.656112	0.1730
D(DBT(-3))	-0.159452	0.052602	-3.031288	0.0387
D(GCF)	0.306320	0.134946	2.269938	0.0857
D(GCF(-1))	-0.413113	0.112345	-3.677188	0.0213
D(GCF(-2))	-0.388799	0.108627	-3.579220	0.0232
D(M3)	0.155630	0.095601	1.627914	0.1789
D(M3(-1))	-1.024308	0.157862	-6.488626	0.0029
D(M3(-2))	-0.972076	0.147900	-6.572534	0.0028
D(M3(-3))	-0.828961	0.153052	-5.416201	0.0056
D(PSC)	0.130841	0.171333	0.763663	0.4876
D(PSC(-1))	0.872506	0.224153	3.892462	0.0177
D(PSC(-2))	0.669327	0.190261	3.517946	0.0245
D(TR)	-0.141912	0.082052	-1.729534	0.1588
D(TR(-1))	1.000320	0.083341	12.00276	0.0003
D(TR(-2))	0.643966	0.117562	5.477678	0.0054
D(TR(-3))	0.468894	0.105937	4.426166	0.0115

D(IN)	-0.106587	0.045365	-2.349565	0.0786
D(IN(-1))	-0.035928	0.052185	-0.688482	0.5290
D(IN(-2))	0.021431	0.043431	0.493453	0.6476
D(IN(-3))	-0.171278	0.076108	-2.250480	0.0876
D(PX)	0.042358	0.103528	0.409142	0.7034
D(PX(-1))	-1.064867	0.140954	-7.554694	0.0016
D(PX(-2))	-0.652090	0.126879	-5.139449	0.0068
D(PX(-3))	-0.138246	0.097554	-1.417133	0.2294
CointEq(-1)*	-0.571623	0.278018	-12.84671	0.0000

R-squared	0.989686	Mean dependent var	0.084493
Adjusted R-squared	0.964760	S.D. dependent var	4.956375
S.E. of regression	0.930423	Akaike info criterion	2.869453
Sum squared resid	10.38823	Schwarz criterion	4.110645
Log likelihood	-30.25851	Hannan-Quinn criter.	3.324399
Durbin-Watson stat	3.092455		

Source: Author’s Computation, 2018

The above table shows the ARDL error correction regression result for Burkina Faso. The error correction term in the model (CointEq(-1) is estimated approximately as -0.5716. This means that if there are disequilibria in the short run, 57.16% of those disequilibria will be corrected within that period. The p-value also suggests that the coefficient is significant at 5% level. This result is in line with Burkina Faso’s sustainability policy. Since 2005, the country’s policy is to face substantial financial deficit with support from the international financial community

(IMF, 2012). Furthermore, their BCEAO membership allows them to benefit from the organisations recovery policies (See section 4.3).

Furthermore, the r-squared shows that the error correction model can only explain 98.96% of the relationships among the variables.

Table 7.8.3: ECM results for Cote D'Ivoire

ECM regression Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	0.072573	0.161647	0.448963	0.6630
D(GR(-2))	0.608953	0.146284	4.162819	0.0019
D(GR(-3))	0.644945	0.128218	5.030066	0.0005
D(DBT)	0.027217	0.027734	0.981348	0.3496
D(DBT(-1))	-0.090324	0.022988	-3.929182	0.0028
D(GCF)	0.988207	0.111323	8.876932	0.0000
D(GCF(-1))	-1.274731	0.267380	-4.767486	0.0008
D(GCF(-2))	-1.817353	0.271561	-6.692245	0.0001
D(GCF(-3))	-1.684555	0.276788	-6.086073	0.0001
D(M3)	0.525487	0.197570	2.659752	0.0239
D(M3(-1))	-0.641922	0.212600	-3.019394	0.0129
D(PSC)	-0.761735	0.223830	-3.403187	0.0067
D(TR)	0.195441	0.083982	2.327167	0.0423
D(TR(-1))	0.157259	0.090631	1.735155	0.1134
D(TR(-2))	0.208566	0.085709	2.433414	0.0352
D(TR(-3))	0.574397	0.106335	5.401773	0.0003

D(IN)	-0.228582	0.048529	-4.710224	0.0008
D(IN(-1))	0.377884	0.077571	4.871453	0.0007
D(IN(-2))	0.625659	0.082586	7.575832	0.0000
D(IN(-3))	0.355382	0.073763	4.817899	0.0007
D(PX)	-0.035176	0.165390	-0.212685	0.8358
D(PX(-1))	1.348493	0.202210	6.668773	0.0001
D(PX(-2))	1.286729	0.193583	6.646923	0.0001
CointEq(-1)*	-0.925043	0.133341	-6.937444	0.0000

R-squared	0.942827	Mean dependent var	0.076766
Adjusted R-squared	0.869773	S.D. dependent var	5.025817
S.E. of regression	1.813666	Akaike info criterion	4.324137
Sum squared resid	59.20893	Schwarz criterion	5.317091
Log likelihood	-66.80688	Hannan-Quinn criter.	4.688094
Durbin-Watson stat	2.414891		

Source: Author's Computation, 2018

It can be observed from looking at the CointEq(-1) from the above table that, 92.50% of disequilibrium in the short run are corrected within that period. It also carries the expected negative sign. The p-value is statistically significant at 5% level. This is due to the enormous financial assistance they receive from the international monetary fund. As mentioned in section 4.3, Cote d'Ivoire had the largest loan program in West Africa for crisis recovery.

Additionally, the R-squared result shows that the error correction model can explain 94.28% of the relationship among the variables in Cote D'Ivoire.

Table 7.8.4: ECM results for Ghana

ECM regression Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	-0.516657	0.040700	-12.69418	0.0011
D(GR(-2))	-0.615024	0.045096	-13.63809	0.0009
D(GR(-3))	-0.401042	0.044481	-9.015986	0.0029
D(DBT)	0.222809	0.022863	9.745588	0.0023
D(DBT(-1))	-0.041292	0.019252	-2.144801	0.1213
D(DBT(-2))	-0.299725	0.021617	-13.86538	0.0008
D(DBT(-3))	-0.218804	0.031337	-6.982396	0.0060
D(GCF)	0.281045	0.070922	3.962734	0.0287
D(GCF(-1))	0.061613	0.087219	0.706417	0.5309
D(GCF(-2))	-0.214085	0.083042	-2.578026	0.0819
D(M3)	0.417678	0.083534	5.000078	0.0154
D(M3(-1))	2.575086	0.133504	19.28848	0.0003
D(M3(-2))	1.580196	0.124839	12.65788	0.0011
D(M3(-3))	2.210977	0.123470	17.90701	0.0004
D(PSC)	-1.559638	0.302072	-5.163126	0.0141
D(PSC(-1))	-2.473708	0.222182	-11.13368	0.0016
D(PSC(-2))	-2.096954	0.189093	-11.08951	0.0016
D(PSC(-3))	0.887104	0.128788	6.888103	0.0063
D(TR)	0.051760	0.035276	1.467297	0.2386
D(TR(-1))	0.038862	0.041417	0.938323	0.4173
D(TR(-2))	0.388390	0.048925	7.938406	0.0042

D(TR(-3))	0.070916	0.039455	1.797398	0.1701
D(IN)	0.079692	0.009841	8.098013	0.0039
D(IN(-1))	-0.672127	0.032332	-20.78806	0.0002
D(IN(-2))	-0.390927	0.023912	-16.34831	0.0005
D(IN(-3))	-0.153509	0.014874	-10.32083	0.0019
D(PX)	0.674843	0.075369	8.953902	0.0029
D(PX(-1))	0.180586	0.065048	2.776206	0.0692
D(PX(-2))	0.440692	0.061559	7.158890	0.0056
D(PX(-3))	0.088443	0.062030	1.425812	0.2492
CointEq(-1)*	-0.777671	0.031105	-25.00164	0.0001

R-squared	0.993742	Mean dependent var	0.024555
Adjusted R-squared	0.976674	S.D. dependent var	5.026908
S.E. of regression	0.767747	Akaike info criterion	2.445704
Sum squared resid	6.483797	Schwarz criterion	3.728270
Log likelihood	-20.35979	Hannan-Quinn criter.	2.915815
Durbin-Watson stat	3.094034		

Source: Author's Computation, 2018

The above results show the robust Error Correction Model result (ECM) for Ghana. The error correction term in the table is denoted as CointEq(-1). The error correction term carries the expected negative sign, is between 0 and 1, and is statistically significant at 5% level as indicated by the p-value. The coefficient for the error correction term supposes that 77.77% of the disequilibrium in the short run are corrected in the same period. As mentioned in the contextual information chapter, Ghana signed onto the HIPC initiative in the early 2000s as a part of their fiscal policies towards economic sustainability. Ghana are also able to get financial assistance from the IMF and are able issue sovereign bonds in times of crisis as part of their monetary policy recovery plans (see section 4.3)

Moreover, the R-squared result shows that the error correction model can explain 99.37% of the relationship among the variables.

Table 7.8.5: ECM results for Mali

ECM regression Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	0.814951	0.056958	14.30793	0.0007
D(GR(-2))	0.173908	0.034950	4.975930	0.0156
D(DBT)	-0.493427	0.022416	-22.01196	0.0002
D(DBT(-1))	-0.686487	0.027605	-24.86796	0.0001
D(DBT(-2))	-0.583354	0.029776	-19.59150	0.0003
D(DBT(-3))	-0.195310	0.024898	-7.844301	0.0043
D(GCF)	1.579200	0.094379	16.73251	0.0005
D(GCF(-1))	-4.856279	0.154245	-31.48425	0.0001
D(GCF(-2))	-2.935763	0.118809	-24.70995	0.0001
D(GCF(-3))	-3.082228	0.117327	-26.27033	0.0001
D(M3)	-0.967259	0.085472	-11.31664	0.0015
D(M3(-1))	2.736958	0.108649	25.19092	0.0001
D(M3(-2))	2.851871	0.095628	29.82271	0.0001
D(M3(-3))	1.556047	0.082042	18.96648	0.0003
D(PSC)	1.658936	0.098528	16.83719	0.0005

D(PSC(-1))	-5.980549	0.168655	-35.46018	0.0000
D(PSC(-2))	-3.071559	0.122628	-25.04787	0.0001
D(PSC(-3))	-0.089978	0.064578	-1.393323	0.2578
D(TR)	0.635089	0.048493	13.09659	0.0010
D(TR(-1))	-0.995474	0.051545	-19.31270	0.0003
D(TR(-2))	0.022620	0.037895	0.596926	0.5926
D(TR(-3))	0.618308	0.047211	13.09681	0.0010
D(IN)	0.101215	0.020502	4.936939	0.0159
D(IN(-1))	-0.429311	0.019984	-21.48320	0.0002
D(IN(-2))	-0.691483	0.025534	-27.08079	0.0001
D(IN(-3))	-0.399711	0.022359	-17.87656	0.0004
D(PX)	0.785754	0.063510	12.37216	0.0011
D(PX(-1))	0.626658	0.053967	11.61183	0.0014
D(PX(-2))	0.932441	0.052130	17.88680	0.0004
D(PX(-3))	0.910129	0.056767	16.03263	0.0005
CointEq(-1)*	-0.702073	0.075558	-35.76169	0.0000

R-squared	0.998025	Mean dependent var	0.176612
Adjusted R-squared	0.992637	S.D. dependent var	8.313206
S.E. of regression	0.713337	Akaike info criterion	2.298690
Sum squared resid	5.597342	Schwarz criterion	3.581255
Log likelihood	-17.27248	Hannan-Quinn criter.	2.768801
Durbin-Watson stat	3.067836		

Source: Author's Computation, 2018

The above results show the robust ECM results for Mali. The error correction term reflected as CointEq(-1) suggests that 70.71% of the disequilibrium in the short-run are corrected in that period. The p-value suggests that the coefficient of the error correction term is significant in explaining the short-run dynamics for Mali at 5% level of significance. This result is also in line with the recovery policy of the BCEAO where they provide urgent funds in situations of financial instability (see section 4.3).

Furthermore, the R-squared infers that the model can explain 99.80% of the relationships among the variables.

Table 7.8.6: ECM results for Niger

ECM regression Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	-0.491873	0.046365	-10.60875	0.0088
D(GR(-2))	-2.444586	0.111294	-21.96508	0.0021
D(GR(-3))	-1.914045	0.081569	-23.46534	0.0018
D(DBT)	0.273892	0.022792	12.01709	0.0069
D(DBT(-1))	1.475180	0.058343	25.28443	0.0016
D(DBT(-2))	0.756084	0.040653	18.59836	0.0029
D(DBT(-3))	0.427017	0.032018	13.33697	0.0056
D(GCF)	1.959899	0.109829	17.84495	0.0031
D(GCF(-1))	7.097799	0.312477	22.71462	0.0019
D(GCF(-2))	5.621199	0.291380	19.29166	0.0027
D(GCF(-3))	3.788589	0.184352	20.55084	0.0024

D(M3)	9.995450	0.448152	22.30369	0.0020
D(M3(-1))	-2.295962	0.234746	-9.780624	0.0103
D(M3(-2))	1.400354	0.175648	7.972500	0.0154
D(M3(-3))	3.406980	0.171169	19.90420	0.0025
D(PSC)	-7.900701	0.416423	-18.97279	0.0028
D(PSC(-1))	4.753223	0.319441	14.87982	0.0045
D(PSC(-2))	5.658776	0.318758	17.75256	0.0032
D(PSC(-3))	1.535545	0.191478	8.019443	0.0152
D(TR)	-0.103693	0.059580	-1.740387	0.2239
D(TR(-1))	-8.120221	0.377416	-21.51533	0.0022
D(TR(-2))	-6.913882	0.325626	-21.23261	0.0022
D(TR(-3))	-4.425606	0.223812	-19.77375	0.0025
D(IN)	0.658466	0.043991	14.96836	0.0044
D(IN(-1))	-2.256591	0.104951	-21.50139	0.0022
D(IN(-2))	-1.867925	0.086255	-21.65575	0.0021
D(IN(-3))	-0.735741	0.038069	-19.32673	0.0027
D(PX)	-1.190599	0.128317	-9.278584	0.0114
D(PX(-1))	5.295184	0.257448	20.56798	0.0024
D(PX(-2))	7.058847	0.321872	21.93058	0.0021
D(PX(-3))	4.524367	0.204892	22.08169	0.0020
CointEq(-1)*	-0.548337	0.067606	-22.90227	0.0009

R-squared	0.997534	Mean dependent var	0.491735
Adjusted R-squared	0.989890	S.D. dependent var	8.342766
S.E. of regression	0.838871	Akaike info criterion	2.575205
Sum squared resid	7.037042	Schwarz criterion	3.899144

Log likelihood	-22.07930	Hannan-Quinn criter.	3.060481
Durbin-Watson stat	1.959128		

Source: Author's Computation, 2018

The above result shows the robust Error Correction Model result (ECM) for Niger. We can see that the error correction term carries the expected negative sign and is statistically significant at 5% level as signified by the p-value. The coefficient for the error correction term infers that about 54.84% of the disequilibrium in the short run is corrected within that period. This result is in line with the recovery policy of the BCEAO where they provide urgent funds in situations of financial instability (see section 4.3).

Likewise, the R-squared result indicates that the error correction model can explain 99.75% of the relationship among the variables.

Table 7.8.7: ECM results for Nigeria

ECM regression Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	-0.764448	0.133018	-5.746950	0.0012
D(GR(-2))	-0.612278	0.131739	-4.647656	0.0035
D(GR(-3))	0.221847	0.096842	2.290816	0.0619
D(DBT)	-0.680744	0.470858	-1.445753	0.1984
D(DBT(-1))	0.313348	0.392787	0.797755	0.4554
D(DBT(-2))	-1.094988	0.510180	-2.146279	0.0755
D(DBT(-3))	1.828604	0.480006	3.809546	0.0089

D(GCF)	-0.887424	0.562632	-1.577274	0.1658
D(GCF(-1))	-0.733833	0.398309	-1.842373	0.1150
D(GCF(-2))	-2.236400	0.402512	-5.556112	0.0014
D(M3)	-0.993338	0.440037	-2.257396	0.0648
D(M3(-1))	-0.778197	0.733291	-1.061239	0.3294
D(M3(-2))	2.749932	0.586647	4.687543	0.0034
D(PSC)	0.850105	0.350048	2.428538	0.0513
D(PSC(-1))	0.552027	0.374504	1.474023	0.1909
D(PSC(-2))	-1.022178	0.388943	-2.628095	0.0392
D(PSC(-3))	1.830352	0.421361	4.343909	0.0049
D(TR)	-0.668565	0.131865	-5.070054	0.0023
D(TR(-1))	0.191401	0.103907	1.842043	0.1151
D(TR(-2))	0.098397	0.106878	0.920653	0.3927
D(TR(-3))	0.308140	0.104296	2.954471	0.0255
D(IN)	-0.199172	0.084252	-2.364002	0.0560
D(IN(-1))	-0.589315	0.103575	-5.689724	0.0013
D(IN(-2))	-0.275859	0.067268	-4.100929	0.0064
D(PX)	-0.927154	0.195459	-4.743471	0.0032
D(PX(-1))	0.232238	0.202776	1.145297	0.2957
D(PX(-2))	0.243725	0.145546	1.674554	0.1450
CointEq(-1)*	-0.162387	0.033197	4.891560	0.0027

R-squared	0.955575	Mean dependent var	-0.065240
Adjusted R-squared	0.869897	S.D. dependent var	9.719064
S.E. of regression	3.505648	Akaike info criterion	5.581349
Sum squared resid	172.0539	Schwarz criterion	6.739795

Log likelihood	-89.20832	Hannan-Quinn criter.	6.005965
Durbin-Watson stat	2.878690		

Source: Author's Computation, 2018

The above results show the robust Error Correction Model result (ECM) for Nigeria. The error correction term carries the expected negative sign and is statistically significant at 5% level as signified by the p-value. The coefficient for the error correction term suggests that about 16.24% of the disequilibrium in the short run is corrected within that period. Nigeria is a highly indebted country with over 80% of its revenue comping from oil exportation. As a result, decline in oil prices affects its ability to revitalise and sustain its economy due to widening current account and budget deficits (see section 4.2).

Also, the R-squared result indicates that the error correction model can explain 95.56% of the relationship among the variables.

Table 7.8.8: ECM results for Senegal

ECM regression

Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	0.819690	0.156355	5.242490	0.0063
D(GR(-2))	0.031041	0.089594	0.346459	0.7465
D(GR(-3))	-0.211651	0.057189	-3.700919	0.0208
D(DBT)	0.078938	0.023384	3.375674	0.0279
D(DBT(-1))	0.107688	0.026450	4.071340	0.0152
D(DBT(-2))	0.021876	0.030664	0.713419	0.5150

D(DBT(-3))	0.178709	0.031780	5.623257	0.0049
D(GCF)	0.610791	0.097749	6.248538	0.0033
D(GCF(-1))	-1.364462	0.211932	-6.438199	0.0030
D(GCF(-2))	-0.071237	0.148908	-0.478397	0.6573
D(GCF(-3))	-0.602394	0.128470	-4.689001	0.0094
D(M3)	0.435814	0.094024	4.635154	0.0098
D(M3(-1))	1.781260	0.167983	10.60384	0.0004
D(M3(-2))	-0.102781	0.209177	-0.491358	0.6489
D(M3(-3))	1.318800	0.214673	6.143299	0.0036
D(PSC)	-1.018228	0.107154	-9.502455	0.0007
D(PSC(-1))	-1.701919	0.244415	-6.963221	0.0022
D(PSC(-2))	-0.315824	0.181354	-1.741473	0.1566
D(PSC(-3))	-0.492852	0.142021	-3.470277	0.0256
D(TR)	-0.613797	0.048244	-12.72267	0.0002
D(TR(-1))	0.580347	0.074065	7.835640	0.0014
D(IN)	0.112230	0.049393	2.272206	0.0855
D(IN(-1))	-0.769264	0.089530	-8.592229	0.0010
D(IN(-2))	-0.341536	0.070739	-4.828115	0.0085
D(IN(-3))	-0.309726	0.044591	-6.945977	0.0023
D(PX)	-0.162712	0.106556	-1.527010	0.2015
D(PX(-1))	1.924037	0.229011	8.401497	0.0011
D(PX(-2))	0.066908	0.220972	0.302787	0.7771
D(PX(-3))	1.148133	0.187472	6.124304	0.0036
CointEq(-1)*	-0.551428	0.231071	-8.877910	0.0009

R-squared	0.992823	Mean dependent var	0.287344

Adjusted R-squared	0.975480	S.D. dependent var	5.101911
S.E. of regression	0.798904	Akaike info criterion	2.564656
Sum squared resid	7.658967	Schwarz criterion	3.805849
Log likelihood	-23.85778	Hannan-Quinn criter.	3.019602
Durbin-Watson stat	2.423595		

Source: Author's Computation, 2018

The above results show the robust Error Correction Model result (ECM) for Senegal. The error correction term carries the expected negative sign and is statistically significant at 5% level as signified by the p-value. The coefficient for the error correction term infers that about 55.14% of the disequilibrium in the short run are corrected within that period. This result is in line with the recovery policy of the BCEAO where they provide urgent funds in situations of financial instability to its members (see section 4.3).

Additionally, the R-squared result indicates that the error correction model can explain 99.28% of the relationship among the variables.

Table 7.8.9: ECM results for Togo

ECM regression Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	-0.221826	0.064296	-3.450092	0.0409
D(GR(-2))	-0.737718	0.079440	-9.286461	0.0026
D(GR(-3))	-0.271848	0.053509	-5.080460	0.0147

D(DBT)	-0.239356	0.027510	-8.700590	0.0032
D(DBT(-1))	-0.242746	0.030069	-8.072965	0.0040
D(DBT(-2))	0.101513	0.021172	4.794814	0.0173
D(DBT(-3))	0.432739	0.032252	13.41723	0.0009
D(GCF)	-0.597157	0.086267	-6.922219	0.0062
D(GCF(-1))	1.293543	0.080256	16.11769	0.0005
D(GCF(-2))	1.170379	0.082401	14.20347	0.0008
D(M3)	0.218680	0.099434	2.199248	0.1153
D(M3(-1))	-0.293231	0.070433	-4.163244	0.0252
D(M3(-2))	-0.926730	0.105334	-8.797989	0.0031
D(M3(-3))	-0.828515	0.109632	-7.557212	0.0048
D(PSC)	1.210305	0.132239	9.152422	0.0028
D(PSC(-1))	-0.047788	0.101841	-0.469244	0.6709
D(PSC(-2))	0.311728	0.109786	2.839417	0.0657
D(PSC(-3))	1.013041	0.114028	8.884182	0.0030
D(TR)	0.209990	0.032390	6.483215	0.0074
D(TR(-1))	-0.043369	0.034872	-1.243665	0.3019
D(TR(-2))	-0.429047	0.041925	-10.23369	0.0020
D(TR(-3))	-0.355681	0.048698	-7.303830	0.0053
D(IN)	0.736815	0.045759	16.10223	0.0005
D(IN(-1))	-1.068036	0.072513	-14.72890	0.0007
D(IN(-2))	-0.882268	0.062909	-14.02457	0.0008
D(IN(-3))	-0.411517	0.045129	-9.118627	0.0028
D(PX)	0.338554	0.062235	5.439952	0.0122
D(PX(-1))	-0.065875	0.081319	-0.810085	0.4772

D(PX(-2))	0.041435	0.080417	0.515253	0.6419
D(PX(-3))	0.290123	0.051648	5.617317	0.0112
CointEq(-1)*	-0.804989	0.073513	-24.55339	0.0001

R-squared	0.995458	Mean dependent var	0.036391
Adjusted R-squared	0.983071	S.D. dependent var	8.260744
S.E. of regression	1.074822	Akaike info criterion	3.118604
Sum squared resid	12.70768	Schwarz criterion	4.401170
Log likelihood	-34.49069	Hannan-Quinn criter.	3.588715
Durbin-Watson stat	2.567696		

Source: Author's Computation, 2018

The above result is the robust Error Correction Model result (ECM) for Togo. We can observe that the error correction term carries the expected negative sign and is statistically significant at 5% level as reflected by the p-value. The coefficient for the error correction term infers that about 80.50% of the disequilibrium in the short run are corrected within the same period. The result is also in line with the recovery policy of the BCEAO where they provide urgent funds in situations of financial instability to its members (see section 4.3).

Besides, the R-squared result indicates that the error correction model can explain 99.54% of the relationship among the variables.

Table 7.8.10 **Summary of Robust ARDL Error Correction Regression**

Countries	Error Correction term (CointEq(-1)	P-Value

Benin	-0.821259	0.0000
Burkina Faso	-0.571623	0.0000
Cote D'Ivoire	-0.925043	0.0000
Ghana	-0.777671	0.0001
Mali	-0.702073	0.0000
Niger	-0.548337	0.0009
Nigeria	-0.162387	0.0027
Senegal	-0.551428	0.0009
Togo	-0.804989	0.0001

Source: Author's Computation, 2018

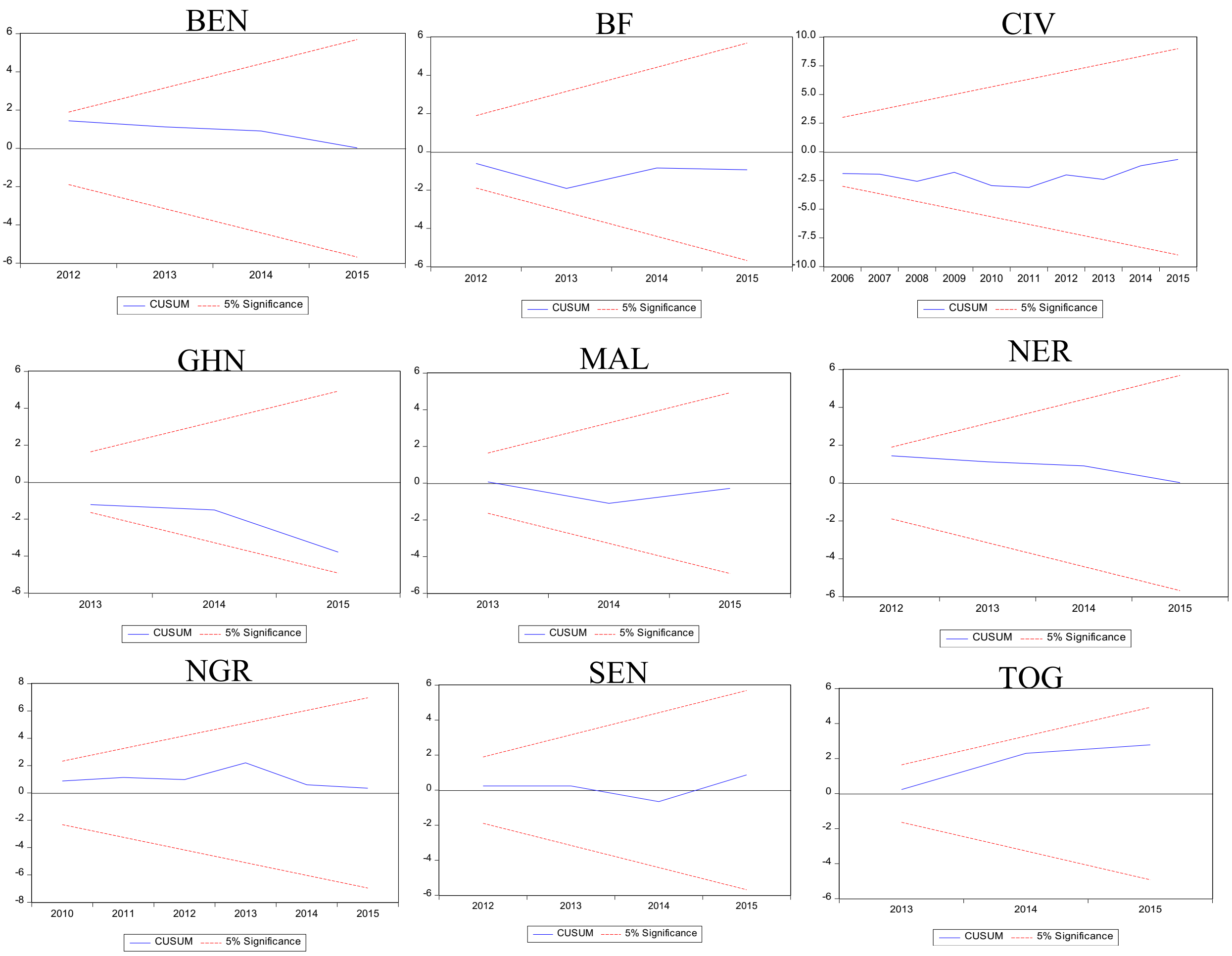
The above table shows the summary of the error correction regression. It features the error correction term and the p-value. The coefficients carry the expected negative signs, the values are between 0 and 1, and additionally, the p-values are less than 0.05. Therefore, they are statistically fit and significant in explaining the short-run equilibrium dynamics among the West African countries.

7.8 **POST DIAGNOSTIC TESTS**

7.8.1 **CUSUM Stability Test**

The cumulative sum test is estimated based on the collective sum of repetitive residuals. It is calculated continually and is plotted along with break points. If the CUSUM line swerves outside the linear margins at the tiniest instance, then the model is categorized as unstable.

Figure 7.2: Robust CUSUM Test results



Source: Author's computation, 2018

Figure 7.2 above shows that the CUSUM plot (in blue) is within the 5% significance margin, thus, it can be concluded that the models are stable for every country tested.

7.8.2 **Serial Correlation LM Test Results**

The Serial Correlation Lagrange Multiplier test is used to check for the presence of autocorrelation. If autocorrelation is detected, this would suggest that the conclusions from the other tests done are incorrect. The null hypothesis for this test is that there is no serial correlation among the variables. The Breush-Godfrey LM test was used for this estimation.

Table 7.9 Breush-Godfrey Serial Correlation LM Test results

	BEN	BF	CIV	GHN	MAL	NER	NIG	SEN	TOG
F-Stat	9.701862	1.139906	2.201518	0.494665	1.357238	0.003423	2.112246	10.26338	1.800586
Pr.F	0.0934	0.3478	0.1308	0.6148	0.5189	0.9628	0.1555	0.0888	0.4662
P.Chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Source: Author's Computation, 2018

Table 7.9 shows the serial correlation LM test results. It shows the F-statistics, p-values of the F-stat and the P-value of the chi square. Looking at the p-values, it can be observed that the estimated figures are greater than 0.05, hence, we do not reject the null hypothesis at 5% level of significance. This means that there is no serial correlation among the variables.

7.8.3 **Granger Causality Test Results**

Since cointegration was detected in the robust model for the disclosed countries, it is important to know what variable granger causes the other. There are three possible outcomes of a granger causality test. Unidirectional causality, bidirectional causality or noncausality. Unidirectional causality is a situation where only one of the two variables granger causes the other. Bidirectional causality on the other hand is a situation whereby both variables granger causes one another. While noncausality, as the name implies, is a situation whereby neither of the variables granger cause one another.

The dependent variable (GR) was tested against the independent variables (DBT, GCF, M3, PSC, TR, IN and PX) and vice-versa. The null hypothesis for the granger causality test is *x* does not granger cause *y*. This null hypothesis is rejected at 5%

level of significance when the p-value is less than 0.05. The table below displays the causality results of the groups that were statistically significant.

Table 7.10: Granger Causality Results

Countries	Null Hypothesis	Chi-Sq	Df	Prob.	Comments
Benin	GR does not granger cause M3	10.98641	4	0.0267	Unidirectional
	M3 does not granger cause GR	1.113120	4	0.8922	Causality
	GR does not granger cause DBT	3.397207	4	0.4937	Unidirectional
	DBT does not granger cause GR	11.77722	4	0.0191	Causality
Burkina Faso	GR does not granger cause TR	23.68387	4	0.0001	Unidirectional
	TR does not granger cause GR	2.775198	4	0.5961	Causality
	GR does not granger cause IN	7.547292	4	0.1096	Unidirectional
	IN does not granger cause GR	18.28174	4	0.0011	Causality
	GR does not granger cause PX	9.988549	4	0.0406	Unidirectional
	PX does not granger cause GR	5.054546	4	0.2817	Causality
Cote D'Ivoire	GR does not granger cause GCF	13.03539	4	0.0111	Bidirectional
	GCF does not granger cause GR	14.50285	4	0.0059	Causality
	GR does not granger cause TR	12.51383	4	0.0139	Unidirectional
	TR does not granger cause GR	3.849275	4	0.4268	Causality
	GR does not granger cause PSC	4.121411	4	0.3898	Unidirectional
	PSC does not granger cause GR	13.00227	4	0.0113	Causality
	GR does not granger cause IN	24.46895	4	0.0001	Unidirectional
	IN does not granger cause GR	8.893978	4	0.0638	Causality

Ghana	GR does not granger cause DBT	14.62569	4	0.0055	Unidirectional
	DBT does not granger cause GR	2.326418	4	0.6760	Causality
	GR does not granger cause M3	24.77607	4	0.0001	Unidirectional
	M3 does not granger cause GR	5.880673	4	0.2082	Causality
	GR does not granger cause PSC	9.731126	4	0.0452	Unidirectional
	PSC does not granger cause GR	0.850386	4	0.9316	Causality
Niger	GR does not granger cause GCF	11.53532	4	0.0212	Unidirectional
	GCF does not granger cause GR	2.537027	4	0.6380	Causality
	GR does not granger cause M3	16.30409	4	0.0026	Bidirectional
	M3 does not granger cause GR	10.46360	4	0.0333	Causality
	GR does not granger cause PSC	12.84615	4	0.0121	Unidirectional
	PSC does not granger cause GR	3.748495	4	0.4411	Causality
	GR does not granger cause TR	12.04314	4	0.0170	Unidirectional
	TR does not granger cause GR	3.200638	4	0.5248	Causality
Nigeria	GR does not granger cause GCF	3.495454	4	0.2296	Unidirectional
	GCF does not granger cause GR	12.44394	4	0.0143	Causality
Senegal	GR does not granger cause DBT	17.18913	4	0.0018	Unidirectional
	DBT does not granger cause GR	4.220207	4	0.3770	Causality
	GR does not granger cause GCF	11.52221	4	0.0213	Unidirectional
	GCF does not granger cause GR	1.621151	4	0.8050	Causality
	GR does not granger cause M3	12.78298	4	0.0124	Unidirectional
	M3 does not granger cause GR	6.334096	4	0.1755	Causality
	GR does not granger cause PX	19.24222	4	0.0007	Unidirectional
	PX does not granger cause GR	4.100629	4	0.3926	Causality

Togo	GR does not granger cause DBT DBT does not granger cause GR	8.646817 18.77448	4 4	0.0706 0.0009	Unidirectional Causality
	GR does not granger cause GCF GCF does not granger cause GR	19.25977 1.342672	4 4	0.0007 0.8539	Unidirectional Causality
	GR does not granger cause IN IN does not granger cause GR	14.87347 14.42847	4 4	0.0050 0.0060	Bidirectional Causality
	GR does not granger cause PX PX does not granger cause GR	22.56455 5.948403	4 4	0.0002 0.2030	Unidirectional Causality

Source: Author's Computation, 2018

Table 7.10 shows the granger causality results for the selected West African countries. As mentioned in section 6.7, granger causality does not infer that one variable cause another, it only implies that past variables of one variable can be used to predict another. In other words, granger causality does not suggest actual causality, but infers prediction.

This test was done to investigate the causal relationship between the independent variables (DBT, GCF, M3, PSC, TR, IN and PX) and the dependent variable (GR) and vice-versa.

The above table shows that there is a causal relationship between GR and M3, and GR and DBT for the case of Benin. The results for GR and M3 indicate a unidirectional causality. This is because the null hypothesis that GR does not granger cause M3 is rejected at 5% level of significance, while the null hypothesis that M3 does not granger cause GR is not rejected at 5% level of significance.

Therefore, it can be concluded that granger causality runs one-way from GR to M3 and not the other way. On the other hand, the results for GR and DBT indicate a unidirectional causality. This is because the null hypothesis that GR does not granger cause DBT is not rejected at 5% significance level, while the null hypothesis that DBT does not granger cause GR is rejected at 5% level of significance. Therefore, it can be concluded that granger causality runs one way from DBT to GR and not the other way.

For the case of Burkina Faso, it can be observed that there are three (3) unidirectional causal relationships between GR and TR, IN and GR, and GR and PX. From the above table, we reject the null hypotheses that GR does not granger cause TR, IN does not granger cause GR, and GR does not granger cause IN at 5% level of significance. Therefore, it can be concluded that there is a causal relationship running one way from GR to TR, IN to GR and GR to PX, and not the other way.

The above results also show that there is one (1) bidirectional causality and three (3) unidirectional causalities for the case of Cote D'Ivoire. The null hypotheses that GR does not granger cause GCF and GCF does not granger GR are rejected at 5% significance level. This infers that granger causality runs both ways from GR to GCF and from GCF to GR. In other words, values GR can be used to predict GCF and vice-versa. On the other hand, the causal relationships between GR and TR, PSC and GR, and GR and IN is unidirectional. This is because we reject the null hypotheses that GR does not granger cause TR, PSC does not granger cause GR, and GR does not granger cause IN at 5% level of significance. The causal relationship runs one way from GR to TR, PSC to GR, and GR to IN, and not the other way.

Similarly, it can be observed from table 7.10 above that there is a unidirectional causality between GR and DBT, GR and M3, and GR and PSC, for the case of Ghana. This is because the null hypothesis for the aforementioned relationship is rejected at 5% level of significance, which infers that granger causality runs one-way from GR to DBT, GR to M3 and GR to PSC, but not the other way.

Furthermore, the granger causality results for Niger indicates one bidirectional causality and three unidirectional causalities. The bidirectional relationship is between GR and M3. The p-values are less than 0.05, so we reject the null hypotheses that GR does not granger cause M3 and M3 does not granger cause GR at 5% level of significance. Therefore, it infers that granger causality runs both ways from GR to M3 and from M3 to GR. Hence, past values of GR can be used in the prediction of M3 and vice-versa. On the other hand, there is a unidirectional causal relationship between GR and GCF, GR and PSC, and GR and TR. The p-values for these variables suggest significance at 5% critical level. Consequently, it means that granger causality runs one way from GR to GCF, GR to PSC and GR to TR, and not the other way.

There appears to be a unidirectional causal relationship between GCF and GR for the case of Nigeria. Looking at the p-values for Nigeria in table 7.10, we reject the null hypothesis that GCF does not granger cause GR at 5% level of significance, while the null hypothesis that GR does not granger cause GCF is not rejected at 5%

significance level. Therefore, it means that granger causality runs one way from GCF to GR, and not the other way.

Additionally, the above results show four (4) unidirectional causality for Senegal. Based on the p-values that are less than 0.05, we reject the null hypotheses that GR does not granger cause DBT, GR does not granger cause GCF, GR does not granger cause M3, and GR does not granger cause PX at 5% level of significance. It therefore implies that granger causality runs one way from GR to DBT, GCF, M3 and PX, and not the other way.

On the other hand, there are three unidirectional causalities and one bidirectional causality for the case of Togo. It can be observed by looking at the p-values that granger causality runs one way from DBT to GR, GR to GCF and GR to PX at 5% level of significance. However, there appears to be a bidirectional causal relationship between GR and IN at 5% level of significance, and hence, past values of GR can be used in the prediction of IN and vice-versa.

It can be concluded from table 7.10, that GR causes TR for the case of Burkina Faso, Cote D'Ivoire and Niger. GR causes PX for the case of Burkina Faso, Senegal and Togo. GR causes M3 for the case of Benin, Ghana, Niger and Senegal. GR causes GCF for the case of Cote D'Ivoire, Niger, Senegal and Togo. GR causes DBT for the case of Ghana and Senegal. GR causes PSC for the case of Ghana and Niger, while GR causes IN for the case of Cote D'Ivoire. On the other hand, DBT causes GR for the case of Benin and Togo. IN causes GR for the case of Burkina

Faso and Togo. GCF causes GR for the case of Cote D'Ivoire and Nigeria. PSC causes GR for the case of Cote D'Ivoire, while M3 causes GR for the case of Niger.

7.9 JOHANSEN COINTEGRATION RESULTS

This test was done in order to ascertain the impact of monetary and fiscal policy instruments in addressing financial instability, in order to answer the second research question (see section 1.5). The Johansen cointegration test shows if there is a long run relationship among the variables. Thus, if cointegration is detected, it implies that the series will not drift away from each other in the long run.

However, if there is disequilibrium in that period, it will adjust and return to the point of equilibrium. The long run relationship is displayed by way of Normalised Cointegrating coefficients. It is also important to note that the signs of the coefficients under the normalised cointegration are usually inverted, so as to ensure correct interpretation. The model used in the Johansen cointegration estimation was stated in section 6.9.

Table 7.11.1: Johansen cointegration Test for Benin

Hypothesized No of CE(s)	Eigen Value	Trace Statistics	0.05 Critical Value	Prob **	Max-Eigen Statistics	0.05 Critical Value	Prob **
None	0.702299	123.5922	69.81889	0.0000*	49.67824	33.87687	0.0003*
At most 1	0.559428	73.91399	47.85613	0.0000*	33.60692	27.58434	0.0074*
At most 2	0.396175	40.30706	29.79707	0.0022*	20.68330	21.13162	0.0577
At most 3	0.339557	19.62376	15.49471	0.0112*	17.00865	14.26460	0.0180
At most 4	0.061792	2.615110	3.841466	0.1058	2.615110	3.841466	0.1058

Note: * connotes presence of cointegration at 5% level of significance

Source: Author’s computation, 2018.

The Trace test in the table above shows four (4) cointegrating equations, while the max-eigenvalue test shows that there are two (2) cointegration equations. Thus, it infers that there is a long run relationship between private sector credit (PSC) and external debt stock (DBT), government spending (PX), inflation (IN) and money supply (M3) at 5% level of significance. Table 7.11.2 below shows the breakdown of the 4 cointegrating equations.

Table 7.11.2. Normalised Cointegrating coefficients (β)

2 Cointegrating Equations			Log likelihood	-448.8891
PSC	DBT	IN	M3	PX
1.000000	0.000000	1.874299	0.380560	-0.419555
		(0.30309)	(0.23093)	(0.44273)
		[6.18397]	[1.64795]	[-0.94765]
0.000000	1.000000	-1.557692	2.091508	3.340508
		(0.68033)	(0.51836)	(0.99377)
		[-2.28961]	[4.03486]	[3.36144]

Note: Standard errors in parentheses (), t-statistics is in brackets []

Source: Author’s computation, 2018

We can see that private sector credit (PSC) and inflation (IN) have a negative relationship in the long run (normalised cointegration results are inverted). This implies that a rise in inflation will cause private sector credit to fall in the long-run. Also, Money supply (M3) has a negative relationship with private sector credit (PSC). This means that when there is an increase in money supply, the private sector credit falls in the long run. Conversely, government spending (PX) has a direct relationship with private sector credit (PSC). This suggests that whenever there is a reduction in government spending, the private sector credit rises in the long run.

However, the rule of thumb for the t-statistic is that if the absolute value of the t-stat is more than 2, then the result is significant at 5% level. Thus, looking at the value of the t-stat for IN, we can conclude that the estimation is significant at 5% level of significance. On the other hand, the t-stat for M3 and PX are lower than 2, meaning that the coefficients are significant in explaining the relationship between M3, PX and PSC in the long run for the case of Benin.

Table 7.11.3 Johansen cointegration Test for Burkina Faso

Hypothesized No of CE(s)	Eigen Value	Trace Statistics	0.05 Critical Value	Prob **	Max-Eigen Statistics	0.05 Critical Value	Prob **
None	0.801031	129.1975	69.81889	0.0000*	66.19887	33.87687	0.0000*
At most 1	0.538848	62.99859	47.85613	0.0010*	31.73512	27.58434	0.0138*
At most 2	0.317580	31.26347	29.79707	0.0337*	15.66650	21.13162	0.2449
At most 3	0.300140	15.59697	15.49471	0.0483*	14.63189	14.26460	0.0437*
At most 4	0.023264	0.965082	3.841466	0.3259	0.965082	3.841466	0.3259

Note: * connotes presence of cointegration at 5% level of significance

Source: Author’s computation, 2018.

Table 7.11.3 shows the Johansen cointegration test for Burkina Faso. The Trace test indicates that there are four (4) cointegrating equations, whereas, the max-eigenvalue shows that there are two (2) cointegrating equations. Therefore, we can conclude that there is a long run relationship between the dependent and independent variables. However, it is important to know the nature of this cointegrating relationship, hence, table 7.11.4 shows the normalised cointegrating relationship for Burkina Faso.

Table 7.11.4. Normalised Cointegrating coefficients (β)

2 Cointegrating Equations			Log likelihood	-391.8741
PSC	DBT	IN	M3	PX
1.000000	0.000000	-0.270730	-0.588931	-0.829305
		(0.18739)	(0.12607)	(0.26425)
		[-1.44474]	[-4.67146]	[-3.13833]
0.000000	1.000000	-0.394670	1.003255	6.531923
		(0.83444)	(0.56142)	(1.17671)
		[-0.47298]	[1.78699]	[5.55100]

Note: Standard errors in parentheses (), t-statistics is in brackets []

Source: Author's computation, 2018

The table above displays the relationship between the cointegrating equations within the period (1970-2015) for the case of Burkina Faso. It can be observed that PSC has cointegrating relationships with inflation (IN), money supply (M3) and government spending (PX). The nature of the relationship is positive. This implies that a rise in inflation, money supply or government spending would result in a rise in private sector credit in the long run for Burkina Faso. The t-stat also suggests that the estimation for M3 and PX are significant at 5% level, while the t-stat for IN is less than 2, hence, it is not significant in explaining the cointegrating relationships in the long run at 5% level of significance.

Table 7.11.5: Johansen cointegration Test for Cote D'Ivoire

Hypothesized No of CE(s)	Eigen Value	Trace Statistics	0.05 Critical Value	Prob **	Max-Eigen Statistics	0.05 Critical Value	Prob **
None	0.734526	113.6194	69.81889	0.0000*	54.37573	33.87687	0.0001*
At most 1	0.649096	59.24371	47.85613	0.0030*	42.93699	27.58434	0.0003*
At most 2	0.210000	16.30672	29.79707	0.6905	9.664605	21.13162	0.7755
At most 3	0.140988	6.642110	15.49471	0.6196	6.230880	14.26460	0.5838
At most 4	0.009980	0.411230	3.841466	0.5213	0.411230	3.841466	0.5213

Note: * connotes presence of cointegration at 5% level of significance

Source: Author's computation, 2018.

It can be seen from table 7.11.5 that both the Trace test and max-eigenvalue test indicate 2 cointegrating equations for Cote D'Ivoire. This implies that there is a long run relationship between the dependent variable (PSC) and the independent variables (DBT, IN, M3 and PX). The nature of this cointegrating relationship is discussed in Table 7.11.6 below.

Table 7.11.6. Normalised Cointegrating coefficients (β)

2 Cointegrating Equations			Log likelihood	-459.9952
PSC	DBT	IN	M3	PX
1.000000	0.000000	-4.042746	-1.845395	10.27247
		(0.77800)	(1.02486)	(2.14902)
		[-5.19633]	[-1.80063]	4.78007]
0.000000	1.000000	-18.61899	-5.561186	57.73234
		(4.33821)	(5.71469)	(11.9831)
		[4.29186]	[-0.97313]	[4.81781]

Note: Standard errors in parentheses (), t-statistics is in brackets []

Source: Author's computation, 2018

The above table shows the normalised cointegrating coefficients for Cote D'Ivoire. It can be seen that private sector credit (PSC) has cointegrating relationships with external debt stock (DBT), inflation (IN), money supply (M3) and government spending (PX). From the above estimation, PSC has a positive relationship with IN in the long run. This means that when there is a rise in inflation rate, private sector credit rises as well. The t-stat for inflation indicates that the coefficient is significant at 5% level in explaining the relationship. Similarly, money supply (M3) has a positive relationship with private sector credit (PSC), inferring that when there is a rise in M3, PSC rises in the long run. However, the t-stat indicates that the coefficient is not significant in explaining the relationship at 5% significance level. On the other hand, government spending (PX) has a negative relationship with private sector credit (PSC), inferring that an increase in PX would also cause PSC to fall. The t-stat shows that the coefficient is significant at 5% level in explaining the relationship between PSC and M3.

Table 7.11.7: Johansen cointegration Test for Ghana

Hypothesized No of CE(s)	Eigen Value	Trace Statistics	0.05 Critical Value	Prob **	Max-Eigen Statistics	0.05 Critical Value	Prob **
None	0.681004	125.2270	69.81889	0.0000*	46.84558	33.87687	0.0009*
At most 1	0.598858	78.38145	47.85613	0.0000*	37.45104	27.58434	0.0020*
At most 2	0.450234	40.93041	29.79707	0.0018*	24.52878	21.13162	0.0160*
At most 3	0.262944	16.40163	15.49471	0.0364*	12.50877	14.26460	0.0930
At most 4	0.090580	3.892859	3.841466	0.0485*	3.892859	3.841466	0.0485*

Note: * connotes presence of cointegration at 5% level of significance

Source: Author's computation, 2018.

The above table shows the cointegration results for Ghana. The Trace test shows 5 cointegrating equations while the Max-eigenvalue test indicates 3 cointegrating equations. This means that there is a long-run relationship between the dependent and independent variables for the case of Ghana. The table below show the normalised cointegrating coefficients.

Table 7.11.8. Normalised Cointegrating coefficients (β)

3 Cointegrating Equations			Log likelihood	-471.6208
PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	-0.475847	0.617804
			(0.16114)	(0.18231)
			[-2.95300]	[3.38875]
0.000000	1.000000	0.000000	-0.767800	-4.948499
			(1.13931)	(1.83458)
			[-0.67391]	[-2.69741]
0.000000	0.000000	1.000000	-0.371285	-0.875132
			(0.40722)	(0.46074)
			[-0.91175]	[-1.89940]

Note: Standard errors in parentheses (), t-statistics is in brackets []

Source: Author's computation, 2018

It can be observed from table 7.11.8 that there is a direct relationship between the dependent variable (PSC) and money supply (M3), inferring that a fall in money supply will result in a drop in private sector credit and vice-versa. The reverse is the case for a rise in money supply. Conversely, PSC has a negative relationship with PX, meaning that when there is a rise in government spending, private sector credit will fall in the long run. Furthermore, the t-statistic for both M3 and PX signifies that the coefficients are significant in explaining the relationship between those variables at 5% level of significance.

Table 7.11.9: Johansen cointegration Test for Mali

Hypothesized No of CE(s)	Eigen Value	Trace Statistics	0.05 Critical Value	Prob **	Max-Eigen Statistics	0.05 Critical Value	Prob **
None	0.522617	83.64127	69.81889	0.0027*	30.31692	33.87687	0.1255
At most 1	0.423528	53.32435	47.85613	0.0140*	22.58400	27.58434	0.1919
At most 2	0.318365	30.74035	29.79707	0.0388*	15.71371	21.13162	0.2420
At most 3	0.234287	15.02664	15.49471	0.0587*	10.94485	14.26460	0.1570
At most 4	0.094761	4.081791	3.841466	0.0433*	4.081791	3.841466	0.0433*

Note: * connotes presence of cointegration at 5% level of significance

Source: Author’s computation, 2018.

The Trace test of the above table shows 3 cointegrating equations, while the max-eigen statistic shows that there is 1 cointegrating equation. This infers that there is a long run relationship between the variables for the case of Mali.

Table 7.11.10. Normalised Cointegrating coefficients (β)

1 Cointegrating Equations			Log likelihood	-499.1959
PSC	DBT	IN	M3	PX
1.000000	-5.792533	31.82189	-57.10147	-63.60437
	(1.77892)	(11.2783)	(23.5083)	(22.7398)
	[-3.25620]	[2.82151]	[-2.42899]	[-2.79705]

Note: Standard errors in parentheses (), t-statistics is in brackets []

Source: Author’s computation, 2018

The above table shows the normalised cointegrated coefficients for the case of Mali. It can be observed that DBT, M3 and PX have a positive relationship with PSC, while IN has a negative relationship with PSC. This means that when there is a rise in DBT, it would result in a rise in PSC in the long run. The same is the case with M3 and PX. On the contrary, a rise in IN will result in a fall in PSC in the long run. Furthermore, the t-statistic indicates that the coefficients are significant in explaining the relationship among the variables at 5% level of significance.

Table 7.11.11: Johansen cointegration Test for Niger

Hypothesized No of CE(s)	Eigen Value	Trace Statistics	0.05 Critical Value	Prob **	Max-Eigen Statistics	0.05 Critical Value	Prob **
None	0.736212	124.5516	69.81889	0.0000*	54.63696	33.87687	0.0001*
At most 1	0.574535	69.91467	47.85613	0.0001*	35.03749	27.58434	0.0046*
At most 2	0.401281	34.87717	29.79707	0.0119*	21.03145	21.13162	0.0516
At most 3	0.267315	13.84573	15.49471	0.0873	12.75261	14.26460	0.0855
At most 4	0.026309	1.093115	3.841466	0.2958	1.093115	3.841466	0.2958

Note: * connotes presence of cointegration at 5% level of significance

Source: Author's computation, 2018.

Table 7.11.11 indicates that the Trace test shows 3 cointegrating equations, while the max-eigenvalue test indicates 2 cointegrating equations for Niger. This implies that there is a long run relationship between the dependent variable (PSC) and the independent variables (DBT, IN, M3 and PX). The type of the cointegrating relationship is discussed in Table 7.11.2 below.

Table 7.11.12. Normalised Cointegrating coefficients (β)

2 Cointegrating Equations			Log likelihood	-444.1563
PSC	DBT	IN	M3	PX
1.000000	0.000000	-0.220518	-2.072623	1.449150
		(0.22379)	(0.25654)	(0.19254)
		[-0.98538]	[-8.07914]	[7.526488]
0.000000	1.000000	9.887138	-5.251464	6.887572
		(2.32734)	(2.66791)	(2.00234)
		[4.24825]	[-1.96838]	[3.43976]

Note: Standard errors in parentheses (), t-statistics is in brackets []

Source: Author's computation, 2018

It can be observed from table 7.11.12 above that PSC has a long run relationship with inflation (IN), money supply (M3), and government spending (PX). It can also be seen that IN and M3 has a positive relationship with PSC (Normalised signs are inverted) for the case of Niger. This means that when there is a rise in the level of inflation or money supply, private sector credit rises in the long run. However, the t-statistic shows that the coefficient of inflation is not significant in explaining the relationship at 5% level of significance. This is because the t-statistic value is less than 2, while the coefficient of money supply is significant in explaining the relationship with private sector credit at 5% significance level.

On the other hand, government spending has an inverse relationship with private sector credit for the case of Niger. This means that when there is a decrease in government spending, the private sector credit rises in the long run. The t-statistic also indicate that the coefficient is significant at 5% level in explaining the relationship between PX and PSC for the case of Niger.

Table 7.11.13: Johansen cointegration Test for Nigeria

Hypothesized No of CE(s)	Eigen Value	Trace Statistics	0.05 Critical Value	Prob **	Max-Eigen Statistics	0.05 Critical Value	Prob **
None	0.849684	145.2557	69.81889	0.0000*	77.69558	33.87687	0.0000*
At most 1	0.647867	67.56009	47.85613	0.0003*	42.79359	27.58434	0.0003*
At most 2	0.286006	24.76650	29.79707	0.1699	13.81213	21.13162	0.3807
At most 3	0.213362	10.95437	15.49471	0.2143	9.839459	14.26460	0.2227
At most 4	0.026827	1.114915	3.841466	0.2910	1.114915	3.841466	0.2910

Note: * connotes presence of cointegration at 5% level of significance

Source: Author's computation, 2018.

The Trace test and max-eigen tests in table 7.11.13 show 2 cointegrating equations. This means that a long run relationship exists between the dependent variable and the independent variable for Nigeria.

Table 7.11.14. Normalised Cointegrating coefficients (β)

2 Cointegrating Equations			Log likelihood	-488.7783
PSC	DBT	IN	M3	PX
1.000000	0.000000	0.320230	0.403908	-0.993065
		(0.06024)	(0.09217)	(0.11156)
		[5.31590]	[4.38221]	[-8.90162]
0.000000	1.000000	-0.298655	0.235576	0.375010
		(0.04380)	(0.06702)	(0.08112)
		[-6.81861]	[3.51501]	[4.62290]

Note: Standard errors in parentheses (), t-statistics is in brackets []

Source: Author's computation, 2018

The above table shows the normalised cointegrating coefficients for Nigeria. It is important to note that the signs of the coefficient are inverted during the normalisation process. It can be seen from the above table that inflation (IN) and government spending (PX) both have an inverse relationship with private sector credit (PSC) in the long run. This implies that when there is a rise in the inflation levels or a rise in government spending, private sector credit falls in the long run. On the other hand, money supply (M3) has a positive long run relationship with PSC. This means that a rise in money supply will bring about a fall in private sector credit in the long run. Furthermore, the t-statistics shows that the signs and coefficient are significant at 5% level in explaining the relationship among the variables.

Table 7.11.15: Johansen cointegration Test for Senegal

Hypothesized No of CE(s)	Eigen Value	Trace Statistics	0.05 Critical Value	Prob **	Max-Eigen Statistics	0.05 Critical Value	Prob **
None	0.733636	110.5883	69.81889	0.0000*	54.23861	33.87687	0.0001*
At most 1	0.540855	56.34968	47.85613	0.0065*	31.91396	27.58434	0.0130*
At most 2	0.268036	24.43572	29.79707	0.1826	12.79300	21.13162	0.4715
At most 3	0.226445	11.64272	15.49471	0.1749	10.52708	14.26460	0.1796
At most 4	0.026844	1.115640	3.841466	0.2909	1.115640	3.841466	0.2909

Note: * connotes presence of cointegration at 5% level of significance

Source: Author's computation, 2018.

Both Trace and max-eigenvalue statistics show 2 cointegrating equations. This signifies that there is a long-run relationship between the independent variable (DBT, IN, M3 and PX) and the dependent variable (PSC) for the case of Senegal.

Table 7.11.16. Normalised Cointegrating coefficients (β)

2 Cointegrating Equations			Log likelihood	-435.7900
PSC	DBT	IN	M3	PX
1.000000	0.000000	-3.502119	-3.487963	2.379255
		(0.89159)	(1.15526)	(1.01405)
		[-3.92795]	[-3.01920]	[2.34629]
0.000000	1.000000	2.406379	0.590256	0.304215
		(0.44712)	(0.57934)	(0.50853)
		[5.38195	[1.01884]	[0.59822]

Note: Standard errors in parentheses (), t-statistics is in brackets []

Source: Author's computation, 2018

From Table 7.11.16, we can deduce that IN and M3 have a positive long run relationship with PSC. This means that an increase in IN or M3 will result in an increase in PSC by a certain percentage in the long run. Furthermore, PX has a negative relationship with PSC, indicating that whenever there is a rise in PX, PSC will fall by a certain percentage in the long run. Additionally, the t-statistics indicates that the sign and coefficients of the model are significant in explaining the relationship in the long run at 5% level, for the case of Senegal.

Table 7.11.17: Johansen cointegration Test for Togo

Hypothesized No of CE(s)	Eigen Value	Trace Statistics	0.05 Critical Value	Prob **	Max-Eigen Statistics	0.05 Critical Value	Prob **
None	0.857791	163.2720	69.81889	0.0000*	79.96876	33.87687	0.0000*
At most 1	0.590920	83.30326	47.85613	0.0000*	36.64764	27.58434	0.0026*

At most 2	0.432874	46.65562	29.79707	0.0003*	23.25409	21.13162	0.0248*
At most 3	0.318964	23.40153	15.49471	0.0026*	15.74975	14.26460	0.0289*
At most 4	0.170248	7.651787	3.841466	0.0057*	7.651787	3.841466	0.0057*

Note: * connotes presence of cointegration at 5% level of significance

Source: Author's computation, 2018.

The table above indicates that both trace and max-eigenvalue indicate 5 cointegrating equations. This infers that there is a long run relationship between PSC and the independent variables (DBT, M3, IN, PX).

Table 7.11.18. Normalised Cointegrating coefficients (β)

4 Cointegrating Equations			Log likelihood	-430.0431
PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	0.000000	0.005761
				(0.17586)
				[0.03276]
0.000000	1.000000	0.000000	0.000000	3.480395
				(0.82649)
				[4.21105]
0.000000	0.000000	1.000000	0.000000	0.047466
				(0.15961)
				[0.29739]
0.000000	0.000000	0.000000	1.000000	0.480810
				(0.32195)
				[1.49343]

Note: Standard errors in parentheses (), t-statistics is in brackets []

Source: Author's computation, 2018

The above table shows that there is a negative long run relationship between PSC and PX. This means that when there is a rise in PX, PSC will fall by a certain amount. However, the t-statistic shows that the coefficient is not significant at 5% level in explaining the relationship between those variables.

Based on the Johansen cointegration results for West African countries, we can conclude that there is a long run relationship between monetary and fiscal policy instruments and financial stability. However, since this test was conducted to find out what policy instruments has the most impact, table 7.12 below shows the impact of policy instruments tested (DBT, IN, M3 and PX) on financial instability (PSC).

Table 7.12: **Impact of monetary and fiscal policy instruments on financial instability**

	DBT	**IN**	**M3**	**PX**
BEN	No	Yes	No	No
BF	No	No	Yes	Yes
CIV	No	Yes	No	Yes
GHN	No	No	Yes	Yes
MAL	Yes	Yes	Yes	Yes
NER	No	No	Yes	Yes
NIG	No	Yes	Yes	Yes
SEN	No	Yes	Yes	Yes
TOG	No	No	No	No

As mentioned in section 6.9, external debt (DBT) and government spending (PX) represents fiscal policy instruments, while inflation (IN) and broad money (M3) represents monetary policy, and PSC is used as a proxy for financial instability. The results displayed in table 7.12 above are based on the normalised cointegrating coefficients for each country. Therefore, looking at table 7.12, it can be concluded that government spending (PX) has the most impact on financial instability among the West African countries. This is because PX has a relationship with PSC in most of the selected countries, except Togo and Benin. The next instrument with a big impact across the selected countries is broad money (M3), as it has a relationship with PSC in most of the countries, except Benin, Cote D'Ivoire and Togo.

This result is consistent with the Keynesian school of thought discussed in chapter 2 (see section 2.2.2). Keynes proposed that when an economy is faced with financial instability, the government should borrow in order to meet its obligations and fund its expenditures. Therefore, it can be inferred that the selected West African countries adopts Keynesian economics when faced with financial instabilities. However, the classical school provides a contrary argument, stating that if this borrowing is not used specifically to tackle government's obligation, it results in economic unproductivity, which affects aggregate investment and results in further economic decline.

7.10 VECM RESULTS

The Vector Error Correction Model (VECM) measures the speed of adjustment of the variables to shocks in the short-run. In other words, it shows how quickly long run disequilibrium is corrected in the current period. The coefficient of the error correction term (CointEq1) is expected to be negative and between zero and one. The t-statistic is used to check the level of significance. The rule of thumb is that if the T-statistic is 2 or more, it is significant at 5%.

Table 7.13.1: Vector Error Correction Results for Benin

Alpha (α)	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	-0.094539	0.933187	-0.153741	-0.003610	0.069360
S.E	(0.10099)	(0.30372)	(0.26410)	(0.09762)	(0.10205)
T-Stat	[-0.93616]	[3.07252]	[-0.58213]	[-0.03698]	[0.67964]

Source: Author's computation, 2018

The table above shows the speed of adjustment of a variable to short run disequilibrium. It can be seen that when there is a shock or disequilibrium in private sector credit (PSC), 9.4% of that disequilibrium will be corrected within the same period. Similarly, any deviation in public debt (DBT) from equilibrium is corrected at an adjustment speed of 93.3% in the short run. The same can be said about inflation (IN), where any short run disequilibrium is corrected at a speed of 15.3% within that period. Furthermore, 0.3% of disequilibrium in money supply is corrected within the same period and 6.9% of disequilibrium in money supply is adjusted in the short run.

As previously mentioned, the coefficient of the cointegrating equation (CointEq1) is expected to be negative and between 0 and 1. Most of the variables in Table 7.13.1 meet this expectation with the exception of DBT. Nevertheless, looking at the T-statistics, it can be seen that it is only the coefficient of DBT that is significant at

5% level in explaining the speed of adjustment for Benin. However, since it does not carry the expected negative sign, the estimation is ambiguous.

Table 7.13.2: Vector Error Correction Results for Burkina Faso

Alpha (α)	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	-0.557040	0.819774	0.265104	0.340431	-0.422554
S.E	(0.15253)	(0.63099)	(0.60871)	(0.23001)	(0.22405)
T-Stat	[-3.65202]	[1.29918]	[0.43552]	[1.48004]	[-1.88599]

Source: Author's computation, 2018

Table 7.13.2 above shows the speed of adjustment of both monetary and fiscal policy instruments to short run disequilibrium in Burkina Faso. It is estimated that about 55.7% of disequilibrium in private sector credit (PSC) is corrected in the short run. The coefficient of PSC carries the expected negative sign and the t-statistic also suggests significance at 5% level. It is also estimated that about 82% of disequilibrium in DBT are corrected in the short-run when there is disequilibrium, inferring that DBT has a better speed of adjustment than the other variables. However, the coefficient is positive, which signifies ambiguity and the t-statistics infer that the coefficient is not significant in estimating the short-run disequilibrium dynamics.

It can also be observed that 26.5% of short run disequilibrium in IN is adjusted in the current period. Similarly, about 34% of the short run disequilibrium in M3 is adjusted within that period. On the other hand, the t-statistics show both coefficients are not significant in explaining the short run dynamics among those variables. Furthermore, PX has the expected value and negative sign. It is estimated that

42.3% of the shocks to PX are corrected in the short run. However, the t-statistics show that the coefficient is not significant in explaining the short run dynamics.

Table 7.13.3: Vector Error Correction Results for Cote D'Ivoire

Alpha (α)	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	0.224810	3.374305	0.154592	0.458015	-0.277296
S.E	(0.26721)	(0.99382)	(1.25381)	(0.34371)	(0.38628)
T-Stat	[0.84133]	[3.39529]	[0.12330]	[1.33256]	[-0.71785]

Source: Author's computation, 2018

The above table shows VECM results for Cote D'Ivoire. It was estimated that 22.4% of the errors in the previous period are adjusted for private sector credit (PSC). Similarly, when there is a shock in government spending (PX), only about 27% of that disequilibrium is adjusted in the short-run. Also, about 33.7% of the disequilibrium public debt (DBT) is adjusted in the short run, while for inflation (IN) and money supply (M3), the speed of adjustment is 15.5% and 45.8% respectively. However, looking at the t-statistics and the signs of the coefficients, those estimates are ambiguous and cannot be used to predict the speed of adjustment.

Table 7.13.4: Vector Error Correction Results for Ghana

Alpha (α)	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	0.198770	-1.174181	-7.191855	0.142754	0.222869
S.E	(0.16982)	(1.35981)	(2.44575)	(0.21065)	(0.33089)
T-Stat	[1.17050]	[-0.86349]	[-2.94055]	[0.67768]	[0.67355]

Source: Author's computation, 2018

Table 7.13.4 shows the short run equilibrium dynamics for Ghana. Looking at the signs of the coefficient, it can be observed that only the coefficients of DBT and IN carry the expected negative sign, however, they are larger than the expected values (i.e. between 0 and 1). This infers that about 117.4% and 719.2% of disequilibrium in DBT and IN are adjusted within the same period. However, this estimation is unrealistic. Even though the t-stat for IN reflects 5% level of significance, the coefficients are ambiguous in explaining the short run dynamic for Ghana.

Table 7.13.5: Vector Error Correction Results for Mali

Alpha (α)	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	0.006746	0.015542	-0.024445	-0.003816	0.006795
S.E	(0.00415)	(0.01565)	(0.01326)	(0.00425)	(0.00468)
T-Stat	[1.62540]	[0.99282]	[-1.84418]	[-0.89836]	[1.45159]

Source: Author's computation, 2018

Table 7.13.5 above shows the speed of adjustment of both monetary and fiscal policy instruments to short run disequilibrium in Mali. It is estimated that about 0.6% of disequilibrium in private sector credit (PSC) is corrected in the short run. The coefficient of PSC does not carry the expected negative sign, and the t-statistic also suggests the coefficient is not significant at 5% level to explain the speed of adjustment. It was also estimated that about 1.5% of disequilibrium in DBT are corrected in the short-run when there is disequilibrium. Furthermore, the coefficient is positive, which signifies ambiguity and the t-statistics implies that the coefficient is not significant in estimating the short-run disequilibrium dynamics. Similarly, the

ECT for PX suggests 6.8% of the errors in the short run are corrected. However, the coefficient is positive, and the value of the t-stat is less than 2, hence, it is not significant in explaining the short run disequilibrium.

Table 7.13.6: Vector Error Correction Results for Niger

Alpha (α)	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	0.203446	-0.676641	-0.673688	0.531408	-0.651514
S.E	(0.10435)	(0.84016)	(0.54140)	(0.09170)	(0.19725)
T-Stat	[1.94967]	[-0.80537]	[-1.24434]	[5.79537]	[-3.30293]

Source: Author's computation, 2018

The t-statistics shows that the error correction term coefficients (CointEq1) for private sector credit (PSC), public debt (DBT), and inflation (IN) are not significant in explaining the short run disequilibrium dynamics for Niger. On the other hand, the coefficient for money supply (M3) suggests that 53.1% of the disequilibrium in the short run are corrected within that period, while the coefficient for government spending (PX) shows that 65.1% of the disequilibrium in the short run are corrected in that period. The t-statistics for M3 and PX shows that the coefficient is statistically significant at 5% level in explaining the short run disequilibrium.

Table 7.13.7: Vector Error Correction Results for Nigeria

Alpha (α)	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	-0.682914	-0.528095	1.006037	-0.888796	-0.539105
S.E	(0.27844)	(0.24980)	(1.23301)	(0.54021)	(0.30963)
T-Stat	[-2.45261]	[-2.11405]	[0.81592]	[-1.64527]	[-1.74115]

Source: Author's computation, 2018

Table 7.13.7 above shows the vector error correction model results for Nigeria. It can be seen that most of the variables have the expected negative sign, with the exception of inflation (IN). The t-statistics for IN, PX and M3 are not statistically significant in explaining the short run equilibrium dynamics.

On the other hand, the t-statistics of PSC and DBT are statistically significant in explaining the short run equilibrium dynamics. It can be observed from the table above that 68.3% of the disequilibrium in PSC is adjusted in the short run. Similarly, 52.8% of the disequilibrium in DBT is corrected in the short run.

Table 7.13.8: Vector Error Correction Results for Senegal

Alpha (α)	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	-0.106872	-0.065506	0.271735	-0.076519	-0.050253
S.E	(0.05462)	(0.13984)	(0.14390)	(0.04087)	(0.05614)
T-Stat	[-1.95664]	[-0.46844]	[1.88834]	[-1.87230]	[-0.89518]

Source: Author's computation, 2018

The table above shows the speed of adjustment to short run disequilibria in Senegal. It is estimated that about 10.7% of disequilibrium in private sector credit (PSC) is corrected in the short run, even though the coefficient of PSC carries the expected negative sign, but the t-statistic also suggests the coefficient is not significant at 5% level in explaining the speed of adjustment. It was also estimated that about 6.5% of disequilibrium in DBT is corrected in the short-run. The coefficient is negative, as expected, but, the t-statistics infers that the coefficient is not significant in estimating the short-run disequilibrium dynamics. Similarly, the ECT for PX suggests 6.8% of the errors in the short run are corrected. However, the coefficient is positive, and the value of the t-stat is less than 2, hence, it is not significant in explaining the short run disequilibrium.

Table 7.13.9: Vector Error Correction Results for Togo

Alpha (α)	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	-0.405467	5.592329	0.069335	-0.369294	-1.258828
S.E	(0.33668)	(1.59811)	(0.75083)	(0.45247)	(0.46912)
T-Stat	[-1.20429]	[3.49933]	[0.09234]	[-0.81618]	[-2.68340]

Source: Author's computation, 2018

The table above shows the VECM results for Togo. The coefficient of the ECT (CointEq1) for PSC suggests that 40.5% of the disequilibrium in the short run is corrected in that period. Even though it carries the expected negative sign, the t-statistics infers that the coefficient is not statistically significant. The ECT for DBT implies that 559.2% of the disequilibrium in the short run is corrected in that period. However, it does not carry the expected negative sign, and so even though the t-statistic is statistically significant, the estimate is ambiguous.

The error correction coefficient for IN shows that 6.9% of the disequilibrium in the short run is corrected in that period. However, it does not carry the negative sign and the t-statistics suggests that the coefficient is not statistically significant in explaining the short run dynamics. Also, the coefficient for M3 infers that 36.9% of the imbalance in the short run is adjusted in that period. Although it has a negative sign, the t-statistic implies that the coefficient is not significant. On the other hand, the coefficient for PX has a negative sign and is statistically significant at 5% level. It is estimated that 125.9% of disequilibrium is adjusted in the short run. However, this estimation is ambiguous.

Overall, it can be concluded based on the estimates that the West African countries used as case study can hardly adjust itself efficiently towards equilibrium in the short run. This is in spite of the cointegration results in section 7.9 inferring that there is a long run impact of monetary and fiscal policy instruments on financial stability. However, if there is a shock in the short run, those instruments are not as effective in addressing instabilities within that period. This situation is also consistent with the Keynesian school of thought, that an economy does not always corrects itself towards equilibrium, and so, governments has to appropriate actions to stimulate the economy towards equilibrium.

7.11 SERIAL CORRELATION TEST

As the VECM results showed that most of the variables do not correct themselves when there is disequilibrium in the short run, it is essential to test for serial correlation in the residuals. The table below shows the residual serial correlation LM test for the variables and for the West African countries. The null hypothesis for this test is that there is no serial correlation at the lag order.

Table 7.13.10: Residual Serial Correlation Results

Country	Lags	LM-Stat	P-values
Benin	1	23.69124	0.5373
	2	19.66477	0.7642
	3	32.64079	0.1403

	4	34.73326	0.0931
Burkina Faso	1	17.25760	0.8722
	2	26.08135	0.4033
	3	37.34511	0.0535
	4	33.05734	0.1296
Cote D'Ivoire	1	35.38205	0.0815
	2	26.87200	0.3623
	3	26.31105	0.3912
	4	27.71602	0.3211
Ghana	1	29.49812	0.2436
	2	17.33791	0.8692
	3	30.13074	0.2194
	4	34.87621	0.0905
Mali	1	30.52299	0.2053
	2	33.49578	0.1191
	3	18.84886	0.8043
	4	26.62074	0.3751
Niger	1	15.98837	0.9152
	2	31.46530	0.1741
	3	18.96957	0.7986
	4	29.85768	0.2297
Nigeria	1	28.29437	0.2945
	2	25.06318	0.4588
	3	27.38470	0.3369

	4	30.21173	0.2165
Senegal	1	23.16000	0.5682
	2	30.27817	0.2140
	3	37.57363	0.0509
	4	23.79162	0.5314
Togo	1	24.70606	0.4789
	2	16.85313	0.8871
	3	14.16380	0.9588
	4	26.32689	0.3903

Source: Author's Computation, 2018

The above table shows the serial correlation estimation for West African countries. We can see that the p-values are more than 0.05, hence, the null hypothesis is not rejected. Therefore, it can be concluded that there is no serial correlation among the residuals of the variables for each country.

7.12 CONCLUSION

This chapter discussed the results of the various econometric tests employed in the study. The first sets of empirical tests undertake were the unit root tests to check the stationarity of the data and lag length selection to determine the appropriate number of lags for conducting the cointegration and error correction tests. The result showed that there was no unit root present and the data is stationary, also that the appropriate number of lags is 4. The next series of tests done were the cointegration tests to test for the nature of relationships between the dependent variables and independent variables for the West African countries. However, the results showed that a long run relationship exists among the variables for 6 out of 9 countries tested. Furthermore, Error Correction regression was conducted for those 6 countries in order to ascertain the short run dynamics. However, only 1 out of the 6 countries had short run dynamics as the coefficients of the others were ambiguous and could not be used to explain the nature of the short dynamics among the variables. Therefore, a robustness test was carried out by adding two explanatory variables (inflation and government spending).

The results of the robust cointegration test suggested that there was a long run relationship among the variable in all nine countries. Similarly, the outcome of the robust cointegration test revealed that the countries were able to adjust themselves back to equilibrium when there is a shock in the variables in the short run. The error correction terms also suggested that the variables were statistically fit to explain the short run dynamics of the West African countries. Furthermore, the serial correlation test indicated that there was no serial correlation in the dataset.

Another set of cointegration tests were carried out to examine which macroeconomic policy instrument had more impact on financial instability among the West African countries. These results demonstrated that there was a long-run relationship and more importantly, that government spending has the most impact on financial instability among these countries. Furthermore, the vector error correction model results showed that the macroeconomic instruments tested are not so effective in correcting short run equilibrium in those West African countries. Also, a serial correlation test was done to test for the presence of autocorrelation in the residuals. It was estimated that there was no serial correlation present among the residuals. The research summary, limitations and evaluation of hypotheses will be discussed in the next chapter and recommendations are also made.

CHAPTER EIGHT

SUMMARY AND POLICY RECOMMENDATIONS

8.1 SUMMARY

Although the region has received various debt relief and experienced significant rise in trade levels in recent years, West African countries are still among the poorest countries in the world. This is because of the amount of public debt they have acquired and also due to the fact that their financial system is not well developed, which has been reflected in their growth rate and their ability to cope with financial instability.

An extensive literature review was undertaken in order to achieve the research objectives, taking into consideration various schools of thought on public debt and also sources of financial instability. The schools of thought discussed were the classical and Keynesian schools of thoughts. According to the empirical findings of this research, it was observed that the selected West African countries mirror Keynesian economics. Keynes suggested that governments should borrow in order to fund their expenditure in situations of financial instability, which was the case with the selected West African Countries for the period under study (1970-2015).

It was concluded that government spending is the most effective macroeconomic policy instrument that these countries can employ in situations of financial instability. The next instrument with the most impact was money supply. This is logical as economic reasoning suggests that an increase in government spending will result in a rise in money supply, whereas, a decrease in government spending results in a decrease in money supply. Similarly, the error correction results suggested that the West African countries were not able to adjust themselves efficiently towards equilibrium when there is a shock to the economy, which was consistent with the Keynesian school of thought, where Keynes proposed that an economy does not always adjusts itself towards equilibrium, therefore, governments need to take necessary actions in order stimulate the economy towards equilibrium.

Furthermore, some sources of financial instabilities were identified and discussed, which were persistent in every major financial instability discussed and were also consistent with the theoretical framework – theories of business cycle. The sources were also present in the selected West African countries; however, two additional sources were considered – public debt and trade. Since the West African countries discussed depend on the export of primary commodities such as oil and agricultural produce, when the demand for those products reduces, it leads to a weakening of current account balance. Therefore, the countries discussed will resort to borrowing in order to carry out their obligations, creating a loss of confidence in investors, and resulting in capital flight, which causes financial instabilities in the financial market.

Based on the theories of business cycle discussed – the Austrian business cycle theory, the Marxian analysis of the business cycle and the financial instability hypothesis, an econometric model was developed using recurring variables across all three theories. These were private sector credit, money supply and investment. Other variables were added such as growth rate of GDP, public debt and trade since the overall aim of this research is to examine the impact of financial instability and public debt on economic growth. The result showed that there was a long run relationship between public debt, financial instability and economic growth in the selected West African countries. The results also showed that fiscal policy instruments are the most effective macroeconomic tools in correcting financial instability among the selected West African countries.

8.2 EVALUATION OF RESEARCH QUESTIONS

RQ1 – What is the nature of the relationship between public debt, financial instability and economic growth in West African countries and what factors can be used to determine this relationship?

In order to address this question, an econometric model was developed (section 6.9). The model was adapted from the theories of business cycle discussed in chapter five (5), for selected West African countries (Benin, Burkina Faso, Cote d'Ivoire, Ghana, Mali, Niger, Nigeria, Senegal and Togo). The model was comprised of growth rate of GDP (GR) as the dependent variable, while the independent variables were external debt stock (DBT), gross capital formation (GCF), private sector credit (PSC), broad money (M3) and Trade (TR). In order to examine the nature of the relationship for the selected West African countries, various statistical analyses were done, including the ARDL cointegration test and Error correction regression.

The initial cointegration and error correction regression tests carried out were ambiguous and were not statistically significant in explaining the relationship. Furthermore, the cointegration results for Burkina Faso, Cote D'Ivoire and Nigeria suggested that there was no long run relationship between the independent and dependent variables. Hence, there was no need to conduct an error correction regression for those countries.

Consequently, a robust test was undertaken adding two macroeconomic variables, inflation (IN) and government spending (PX) [27]. The results of the robust cointegration suggested that a long-run relationship exists between the dependent and independent variables for the selected countries. This infers that public debt, financial instability and economic growth moves together in the long run. In other words, public debt, financial instability and economic growth have an effect on each other in the long run. Since a long run relationship was established, it was important to check the speed of adjustment of the variables in the short run with the aid of an error correction regression.

The Error Correction Regression results suggested that there is a quick response in the short-run to shocks that might destabilise the economy in most of the countries tested. However, the variables tested for Nigeria implied that the country has a relatively slower response to short-run shocks to the economy compared to the other countries. Serial correlation tests were also carried out to check for the presence of autocorrelation among the residuals, and none were found.

Additionally, a granger causality test was done to ascertain what independent variable can be used in the prediction of the dependent variable or vice-versa, for the selected countries. The empirical results suggested that previous values of the growth rate of GDP (GR) can be used in the prediction of trade (TR) in Burkina

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[27] see section 7.7.

Faso, Cote D’Ivoire and Niger. Similarly, past values of GR can be used in the prediction of government spending (PX) in Burkina Faso, Senegal and Togo. Past values of GR can also be used in the prediction of broad money (M3) in Benin, Ghana, Niger and Senegal. Furthermore, past values of GR can be used in the prediction of Gross Capital Formation (GCF) in Cote D’Ivoire, Niger, Senegal and Togo. Also, historical values of GR can be used in the prediction of external debt stock (DBT) in Ghana and Senegal.

Furthermore, past values of GR can be used in the prediction of private sector credit (PSC) in Ghana and Niger, while past values of GR can be used to predict inflation (IN) in Cote D’Ivoire. On the other hand, past values of DBT can be used in the prediction of GR in Benin and Togo. Similarly, past values of IN can be used in the prediction of GR in Burkina Faso and Togo. Also, the previous values of GCF can be used in the prediction of GR in Cote D’Ivoire and Nigeria. Furthermore, past values of PSC can be used in the prediction of GR in Cote D’Ivoire, while values of M3 can be used to predict GR in of Niger.

However, even though a long run relationship was established by the ARDL bound tests, the signs of the coefficients and their significance at 5% critical level as denoted by p-values were not uniform across the countries. The coefficients and p-values of the variables were all significant for Benin, but this was not the case for the other selected countries. The variables used to represent financial instability as adapted from the Business Cycle theories were money supply (M3), investment (GCF) and credit to private businesses (PSC), while public debt and economic growth were represented as external debt stock (DBT) and growth rate of GDP (GR) respectively. DBT had a positive relationship with GR in Benin, Nigeria and Senegal; GCF had a negative relationship with GR in Benin but a positive relationship with GR in Cote D'Ivoire; M3 had a positive relationship with GR in Benin; while PSC had a negative relationship with GR in Benin and Cote D'Ivoire, but a positive relationship with GR in Senegal.

RQ2 – Do monetary and fiscal policy instruments have the same impact in addressing financial instability in West African countries?

In section 3.4, macroeconomic policies were discussed in relation to financial instability. It can be seen that classical economists were basically against government interference in the economy. However, the Keynesians support government interference. During a period of financial instability such as a recession, the Keynesians suggest that government should borrow money or that Central banks purchase government bonds, so as to increase money supply. In section 3.5, various financial instabilities were discussed, and attention was also given to the policy response to the crises discussed. Fiscal policy was mostly used to curb the Asian crisis of late 1997-1999, while monetary policy was mostly used to control the effects of the global financial crisis of 2007-2008 in the United States of America.

In order to address RQ2, this study used Johansen cointegration tests and error correction models. The cointegration tests suggested evidence of a long run relationship among the variables in the West African Countries analysed (see section 7.10). In respect to the policy that has the most impact, the results showed that government spending (as a fiscal policy instrument), had the most impact across

West African countries. The next instrument with a high impact was broad money. This explains why the selected West African countries always seek loans from external sources in order to meet the financial responsibility of both the government and the financial sector.

Since a long run relationship was established, it was important to know the short run equilibrium dynamics. Therefore, an error correction model analysis was carried out. The results were either not statistically significant or the results were ambiguous. The variables that had the expected sign and statistical significance were PSC for Burkina Faso, PX for Niger and then, PSC and DBT for Nigeria. Therefore, it can be inferred that the West African countries are unable to cope with short run equilibrium shocks. This can be attributed to two key factors – the financial markets are not well developed enough to withstand shocks, or the economy is not viable to withstand unexpected shocks to the economy.

8.3 POLICY RECOMMENDATIONS

This segment provides policy recommendations in relation to the outcomes of this research.

i. Sustaining Economic Growth

The empirical results show a long run relationship between public debt, financial instability and economic growth. Although not all variables representing those concepts were significant, public debt (measured by external debt stock) has a positive relationship with economic growth (measured by growth rate of GDP) in all the countries disclosed. This is because these countries borrow from external sources so as to enable them to carry out their obligations. As pointed out in section

4.2, these countries depend on the export of primary commodities so as to take care of their responsibilities. However, when the demand for these commodities fall, the government is no longer able to get enough money to fulfil its obligation, hence must borrow from external sources. As stated earlier, the governments of these countries seem to adopt a Keynesian school of economic thought whereby borrowing is used as a tool to handle instabilities.

Therefore, in order to avoid excessive debt levels, attention should be paid to the growth rates of GDP. The granger causality results also suggest that GR can be used to predict debt, especially in Ghana and Senegal. Since the nature of the relationship between DBT and GR is positive, it means that a high rate of public debt will result in a high rate of economic growth, and vice-versa. Even though public debt affects economic growth positively in these countries, there has to be precautionary measures in place so that the level of debt does not rise above a manageable amount. For this reason, economic recovery plans and repayment strategies should be put in place for short-term, medium-term and long-term debts. This is because countries with high rates of public debts are at risk of having compound interest problems. Also, a monitoring and evaluation agency or initiative has to be created for the supervision of those short, medium, and long-term debts. Furthermore, the monitoring and evaluation agency should be given the authority to enforce the debt repayment strategies.

ii. **Dealing with Financial Instability**

The results show that government spending has an impact in most of the countries. As already stated, those governments borrow in times of instability so as to meet their obligations. However, the borrowed money is not necessarily spent on the private sector, which means that investment would always be low in those countries. Of three countries whose cointegration results for private sector credit (PSC) were significant (Benin, Cote D'Ivoire and Senegal), two of them (Benin and Senegal) indicated a negative relationship with GR. PSC was one of the variables used to measure financial stability. The results indicate that when there is a rise in GR, PSC falls. This implies that the money borrowed is not reflected in the private sector, which is what the classical school of thought are against (see section 2.2.1). These theorists propose that governments should not intervene in an economy because they move funds from productive areas of society to the unproductive areas.

As mentioned under sustaining economic growth (in the policy recommendation section), a rate high public debt in these countries causes an increase in economic growth. But the effect of this borrowing and growth is not reflected in the private sector (as suggested by the results). Therefore, governments of the selected countries can form a partnership with the private sector and international investors so as to boost productivity and innovation in the country. Also, government can create or increase the scope of financial regulatory agencies, so that they can make it easy for investors to have easy access to funds. This process can help to even out the gap between public sector wealth and private sector wealth.

The next variable with more influence on financial instability is money supply. The result suggests that the best way to deal with financial instability is to control the amount of money in circulation. This is because when a government increases its spending, there is more money in circulation and vice-versa. Thus, policy makers can use both monetary and fiscal policy instruments in addressing financial instabilities for those countries, based on our results.

iii. Trade and Investment

Trade and investment are really important for the economic development of the selected countries. As mentioned in section 4.2, trade was one the channels through which the global financial crisis and euro sovereign crisis affected West African countries. The disclosed countries depend a lot on the exportation of primary commodities such as agricultural products and natural resources such as crude oil, iron ore and gold for the generation of revenue. Therefore, effort has to be made to support the stakeholders in those sectors. The results showed that there is a significant linkage between the growth rate of GDP and Trade for at least three of those countries – Burkina Faso, Cote D'Ivoire, and Niger.

Similarly, there is a significant causal relationship between the level of investment (GCF) and the growth rate of GDP (GR) for at least four countries – Cote D'Ivoire, Niger, Nigeria and Senegal. Therefore, targeted efforts have to be made by these countries to encourage investments in the trade industries. Some of the targeted efforts can be in form of creating initiatives that would encourage private investors to participate in the agricultural, oil and mining sectors. The governments can also create an enabling environment that allows foreign investor an ease to do business in those aforementioned industries, such as reducing corporate taxation. Furthermore, governments can provide loans and grants for local businesses and developers, and also exportation process of primary commodities should be simplified so as to attract investors' interest.

8.4 CONTRIBUTIONS TO KNOWLEDGE

This study has made some contributions to knowledge and they are listed as follow.

a. Previous studies have focused solely on the relationship between public debt and economic growth; the effect of debt burden on economic growth; the impact of financial stability on economic growth; the impact of macroeconomic policy on economic growth; or the impact of financial instability on public debt. In contrast, this research has demonstrated that there is a linkage between the three concepts and the empirical results have shown that a relationship exists between them. The uniqueness of this study is embedded in evaluating the relationship between public debt and financial instability on economic growth particularly for the selected West African countries discussed.

b. Since the study linked those three concepts, it was essential to develop an econometric model to reflect the interrelationship among them. The model was deduced from the theories of business cycles and adapted specifically for those West African countries, with two additional variables added, based on unique channels through which financial instability impacts West African economies. Furthermore, the empirical results have demonstrated that the robust model is stable, and it can be used to ascertain the nature of relationship between public debt, financial instability and economic growth.

c. The study also provided some policy recommendations in relation to public debt, financial instability, as well as trade and investment for the selected West African countries. Governments of these countries were encouraged to establish economic recovery plans for all forms of public debt in order to avoid compound interest problems. They were also encouraged to form a partnership with the private sector as the cointegration results suggested a negative relationship between growth rate of GDP and private sector credit. Therefore, the partnership would allow the private sector to have access to funds for innovation and expansion, which would improve their balance sheets. Policy makers of these countries were also advised to create an enabling environment for local and foreign investors to participate in the primary commodity sector. This is because trade is an important transmission channel for financial instability in those countries.

In essence, this study has improved the existing understanding of how the relationship between public debt, financial instability and economic growth can be determined, especially for West Africa.

8.5 LIMITATIONS AND AREAS FOR FURTHER RESEARCH

I. The robust ARDL cointegration results showed the existence of a long run relationship between the variables but the coefficients of the variables were not significant in explaining the elasticities for most of the selected countries. Even though Benin, Burkina Faso, Cote D'Ivoire, Mali, Niger, Senegal and Togo have the same Central Bank, their results did not follow the same trend. The empirical results showed that the only country whose coefficients and p-values were all significant was Benin. On the other hand, Cote D'Ivoire, Nigeria, Mali and Senegal had a few variables with significant p-values, while for Niger, Togo and Ghana there were none. Therefore, some alternative variables could be further examined and used for estimation for either a shorter period or longer period. For instance, instead of growth rate of GDP, real GDP can be used or instead of gross capital formation, investment can be used when forming the model. The suggested variables were not incorporated into this model because all the data for those variables was not readily available for each and every country.

II. Private sector credit was used as a proxy for the financial resources available to the financial sector. Although this variable captures to a certain extent the financial strength of a country, other indicators such as balance sheets of banks or bank nonperforming loans to total gross loans could have been considered. However, this was not the case as data was limited and was not available from 1970 to 1990. Hence, they were not used.

In spite of these limitations, the results gathered in this study were carefully explained. However, since the elasticities could not be addressed and also given the limited data on other financial instability measures, further studies will need to be done to address these limitations.

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APPENDICES

APPENDIX A: Bounds Cointegration Test Results

Bounds Results for Benin

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(1, 3, 2, 2, 0, 0)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 09:39
Sample: 1970 2015
Included observations: 43

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.196416	3.692342	-2.219842	0.0344
GR(-1)*	-1.042474	0.133720	-7.795927	0.0000
DBT(-1)	-0.009234	0.020499	-0.450460	0.6557
GCF(-1)	-0.079398	0.130574	-0.608068	0.5479
M3(-1)	-0.177025	0.088282	-2.005223	0.0544
PSC**	0.025617	0.065315	0.392208	0.6978
TR**	0.337343	0.079635	4.236137	0.0002
D(DBT)	-0.077584	0.047253	-1.641877	0.1114
D(DBT(-1))	-0.062545	0.047435	-1.318528	0.1976
D(DBT(-2))	-0.048422	0.046444	-1.042585	0.3058
D(GCF)	-0.213671	0.127815	-1.671718	0.1053
D(GCF(-1))	-0.396579	0.111897	-3.544155	0.0014
D(M3)	-0.075282	0.149515	-0.503510	0.6184
D(M3(-1))	0.371530	0.155222	2.393548	0.0234

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	-0.008858	0.021308	-0.415708	0.6807
GCF	-0.076163	0.113638	-0.670226	0.5080
M3	-0.169812	0.081577	-2.081604	0.0463
PSC	0.024573	0.065503	0.375146	0.7103
TR	0.323598	0.078613	4.116320	0.0003
C	-7.862466	3.605026	-2.180973	0.0374

EC = GR - (-0.0089*DBT -0.0762*GCF -0.1698*M3 + 0.0246*PSC + 0.3236 *TR -7.8625)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	9.264918	10%	2.08	3

k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Bounds Results for Burkina Faso

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(3, 4, 4, 2, 4, 3)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 09:47
Sample: 1970 2015
Included observations: 42

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.386491	7.947289	0.677777	0.5076
GR(-1)*	-1.741749	0.450955	-3.862358	0.0014
DBT(-1)	0.091468	0.108245	0.845012	0.4106
GCF(-1)	0.270109	0.442772	0.610041	0.5504
M3(-1)	-0.282183	0.422754	-0.667487	0.5140
PSC(-1)	-0.398013	0.407026	-0.977858	0.3427
TR(-1)	0.125634	0.140630	0.893361	0.3849
D(GR(-1))	0.661854	0.366189	1.807413	0.0895
D(GR(-2))	0.475378	0.237372	2.002672	0.0625
D(DBT)	-0.328070	0.120895	-2.713677	0.0153
D(DBT(-1))	0.008043	0.120335	0.066839	0.9475
D(DBT(-2))	-0.221640	0.129607	-1.710093	0.1066
D(DBT(-3))	-0.398970	0.169997	-2.346927	0.0321
D(GCF)	0.365841	0.241615	1.514150	0.1495
D(GCF(-1))	-0.654626	0.349371	-1.873729	0.0794
D(GCF(-2))	-0.699498	0.274691	-2.546491	0.0216
D(GCF(-3))	0.248674	0.163371	1.522148	0.1475
D(M3)	0.079805	0.266825	0.299093	0.7687
D(M3(-1))	0.711539	0.350380	2.030764	0.0592
D(PSC)	-0.926238	0.379874	-2.438279	0.0268
D(PSC(-1))	0.592071	0.457832	1.293207	0.2143
D(PSC(-2))	0.199247	0.366064	0.544294	0.5937
D(PSC(-3))	-0.532527	0.378872	-1.405561	0.1790
D(TR)	-0.098747	0.185240	-0.533075	0.6013
D(TR(-1))	0.459253	0.183356	2.504706	0.0235
D(TR(-2))	0.305000	0.230020	1.325971	0.2035

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.052515	0.065922	0.796623	0.4373
GCF	0.155079	0.207162	0.748589	0.4650

M3	-0.162011	0.230955	-0.701483	0.4931
PSC	-0.228514	0.232531	-0.982725	0.3404
TR	0.072131	0.048327	1.492542	0.1550
C	3.092576	4.227036	0.731618	0.4750

EC = GR - (0.0525*DBT + 0.1551*GCF -0.1620*M3 -0.2285*PSC + 0.0721
*TR + 3.0926)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	3.938331	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Bounds Results for Cote D'Ivoire

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(4, 0, 1, 0, 0, 3)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 09:56
Sample: 1970 2015
Included observations: 42

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.59622	13.61682	0.851610	0.4017
GR(-1)*	-1.248297	0.318533	-3.918889	0.0005
DBT**	-0.022916	0.024173	-0.947966	0.3513
GCF(-1)	0.315378	0.181843	1.734343	0.0939
M3**	0.396402	0.180940	2.190790	0.0370
PSC**	-0.180651	0.108323	-1.667712	0.1065
TR(-1)	-0.226272	0.137350	-1.647410	0.1107
D(GR(-1))	0.372530	0.263407	1.414277	0.1683
D(GR(-2))	0.194688	0.204255	0.953161	0.3487
D(GR(-3))	0.327788	0.154750	2.118182	0.0432
D(GCF)	0.685711	0.187802	3.651248	0.0011
D(TR)	-0.152208	0.117521	-1.295153	0.2058
D(TR(-1))	0.188639	0.112499	1.676806	0.1047
D(TR(-2))	0.257353	0.103765	2.480160	0.0194

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	-0.018358	0.013823	-1.328061	0.1949

GCF	0.252647	0.074459	3.393092	0.0021
M3	0.317554	0.142791	2.223914	0.0344
PSC	-0.144718	0.053574	-2.701276	0.0116
TR	-0.181264	0.066173	-2.739260	0.0106
C	9.289635	7.694832	1.207256	0.2374

EC = GR - (-0.0184*DBT + 0.2526*GCF + 0.3176*M3 -0.1447*PSC -0.1813
*TR + 9.2896)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	2.894789	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Bounds Results for Ghana

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(1, 0, 0, 0, 4, 0)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 10:05
Sample: 1970 2015
Included observations: 42

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.187407	3.121225	1.021204	0.3151
GR(-1)*	-0.939801	0.166552	-5.642687	0.0000
DBT**	-0.087823	0.053738	-1.634289	0.1123
GCF**	0.345964	0.221771	1.560006	0.1289
M3**	0.016321	0.212716	0.076729	0.9393
PSC(-1)	-0.590711	0.549638	-1.074728	0.2908
TR**	0.063275	0.113872	0.555673	0.5824
D(PSC)	-0.218573	0.489280	-0.446725	0.6582
D(PSC(-1))	0.544490	0.537922	1.012210	0.3193
D(PSC(-2))	1.064086	0.496418	2.143530	0.0400
D(PSC(-3))	1.444116	0.424825	3.399320	0.0019

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	-0.093449	0.040898	-2.284916	0.0293
GCF	0.368125	0.126006	2.921488	0.0064
M3	0.017367	0.248493	0.069889	0.9447

PSC	-0.628549	0.425039	-1.478804	0.1493
TR	0.067329	0.079187	0.850254	0.4017
C	3.391578	3.460330	0.980131	0.3346

EC = GR - (-0.0934*DBT + 0.3681*GCF + 0.0174*M3 -0.6285*PSC + 0.0673
*TR + 3.3916)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.580599	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Bounds Results for Mali

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(1, 1, 0, 0, 1, 1)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 10:11
Sample: 1970 2015
Included observations: 45

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.716679	12.25133	-0.303370	0.7634
GR(-1)*	-1.266562	0.147061	-8.612512	0.0000
DBT(-1)	0.031216	0.035382	0.882234	0.3837
GCF**	-0.177334	0.386851	-0.458405	0.6495
M3**	0.115402	0.177791	0.649087	0.5205
PSC(-1)	0.121604	0.276795	0.439331	0.6631
TR(-1)	0.112123	0.112964	0.992563	0.3277
D(DBT)	-0.146656	0.090365	-1.622940	0.1136
D(PSC)	-0.417403	0.306996	-1.359638	0.1826
D(TR)	-0.121863	0.157540	-0.773534	0.4444

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.024646	0.020630	1.194645	0.2403
GCF	-0.140012	0.436017	-0.321117	0.7500
M3	0.091115	0.106163	0.858252	0.3966
PSC	0.096011	0.225458	0.425850	0.6728
TR	0.088526	0.096721	0.915271	0.3663
C	-2.934464	9.419890	-0.311518	0.7573

EC = GR - (0.0246*DBT -0.1400*GCF + 0.0911*M3 + 0.0960*PSC + 0.0885
*TR -2.9345)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	11.84080	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Bounds Results for Niger

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(4, 4, 4, 4, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 10:53
Sample: 1970 2015
Included observations: 42

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-40.66815	11.54610	-3.522242	0.0042
GR(-1)*	-1.250362	0.265069	-4.717126	0.0005
DBT(-1)	-0.312436	0.072246	-4.324596	0.0010
GCF(-1)	-3.102119	0.705455	-4.397333	0.0009
M3(-1)	3.070558	0.685536	4.479061	0.0008
PSC(-1)	-3.680145	0.754094	-4.880221	0.0004
TR(-1)	2.261640	0.518270	4.363823	0.0009
D(GR(-1))	-0.310223	0.208817	-1.485620	0.1632
D(GR(-2))	-0.413794	0.182731	-2.264497	0.0429
D(GR(-3))	-0.438181	0.125430	-3.493432	0.0044
D(DBT)	-0.115054	0.065470	-1.757352	0.1043
D(DBT(-1))	0.348011	0.063575	5.474057	0.0001
D(DBT(-2))	0.136022	0.056756	2.396599	0.0337
D(DBT(-3))	0.075868	0.058388	1.299383	0.2182
D(GCF)	-0.179480	0.327546	-0.547954	0.5938
D(GCF(-1))	2.567841	0.453566	5.661446	0.0001
D(GCF(-2))	1.899351	0.443290	4.284670	0.0011
D(GCF(-3))	1.264479	0.277277	4.560346	0.0007
D(M3)	0.579787	0.411638	1.408487	0.1844
D(M3(-1))	-0.452078	0.476137	-0.949472	0.3611
D(M3(-2))	0.371959	0.463004	0.803360	0.4374
D(M3(-3))	0.854202	0.455825	1.873971	0.0855
D(PSC)	-0.329075	0.524105	-0.627880	0.5418
D(PSC(-1))	1.259736	0.620649	2.029708	0.0652
D(PSC(-2))	1.888627	0.689905	2.737518	0.0180
D(PSC(-3))	0.839615	0.577206	1.454619	0.1714
D(TR)	-0.038018	0.148255	-0.256435	0.8020
D(TR(-1))	-1.928891	0.383232	-5.033217	0.0003
D(TR(-2))	-1.486888	0.360691	-4.122335	0.0014
D(TR(-3))	-0.607147	0.237738	-2.553846	0.0253

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	-0.249876	0.059573	-4.194482	0.0012
GCF	-2.480977	0.549375	-4.516001	0.0007
M3	2.455736	0.480038	5.115712	0.0003
PSC	-2.943264	0.564858	-5.210628	0.0002
TR	1.808789	0.398639	4.537404	0.0007
C	-32.52510	8.078864	-4.025950	0.0017

EC = GR - (-0.2499*DBT -2.4810*GCF + 2.4557*M3 -2.9433*PSC + 1.8088
*TR -32.5251)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	9.603462	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Bounds Results for Nigeria

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(3, 4, 2, 2, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 11:03
Sample: 1970 2015
Included observations: 42

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.98499	8.431153	1.658728	0.1155
GR(-1)*	-0.855838	0.302476	-2.829443	0.0116
DBT(-1)	-1.049445	0.432494	-2.426495	0.0267
GCF(-1)	-1.042526	0.318203	-3.276292	0.0045
M3(-1)	-0.311868	0.490405	-0.635939	0.5333
PSC(-1)	0.781282	0.472193	1.654584	0.1164
TR(-1)	0.028170	0.089869	0.313458	0.7577
D(GR(-1))	-0.056989	0.230407	-0.247342	0.8076
D(GR(-2))	-0.433204	0.154818	-2.798141	0.0124
D(DBT)	0.728853	0.543497	1.341043	0.1976
D(DBT(-1))	2.041380	0.537003	3.801431	0.0014
D(DBT(-2))	-0.458639	0.445103	-1.030411	0.3173
D(DBT(-3))	0.537283	0.519939	1.033357	0.3159

D(GCF)	0.300608	0.474044	0.634135	0.5344
D(GCF(-1))	1.905078	0.560341	3.399853	0.0034
D(M3)	-0.671168	0.536287	-1.251508	0.2277
D(M3(-1))	-1.327362	0.448771	-2.957775	0.0088
D(PSC)	0.584447	0.494836	1.181094	0.2538
D(PSC(-1))	0.782878	0.434327	1.802507	0.0892
D(PSC(-2))	-0.654045	0.237487	-2.754017	0.0136
D(PSC(-3))	-0.474862	0.236710	-2.006094	0.0610
D(TR)	-0.119889	0.118123	-1.014947	0.3244
D(TR(-1))	-0.020590	0.128005	-0.160855	0.8741
D(TR(-2))	-0.188422	0.121963	-1.544910	0.1408
D(TR(-3))	0.253360	0.109323	2.317544	0.0332

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	-1.226220	0.641657	-1.911020	0.0730
GCF	-1.218136	0.419734	-2.902162	0.0099
M3	-0.364400	0.500863	-0.727545	0.4768
PSC	0.912886	0.301144	3.031391	0.0075
TR	0.032915	0.066183	0.497340	0.6253
C	16.34070	5.802112	2.816336	0.0119

EC = GR - (-1.2262*DBT -1.2181*GCF -0.3644*M3 + 0.9129*PSC + 0.0329 *TR + 16.3407)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	3.091222	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Bounds Results for Senegal

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(4, 1, 1, 2, 1, 0)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 11:11
Sample: 1970 2015
Included observations: 42

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.43829	4.751844	2.828015	0.0087

GR(-1)*	-2.181144	0.410389	-5.314818	0.0000
DBT(-1)	-0.001987	0.023707	-0.083808	0.9338
GCF(-1)	0.548340	0.157393	3.483893	0.0017
M3(-1)	-0.167244	0.126344	-1.323711	0.1967
PSC(-1)	-0.075605	0.091367	-0.827490	0.4152
TR**	-0.160543	0.075450	-2.127794	0.0426
D(GR(-1))	0.846245	0.318016	2.661016	0.0130
D(GR(-2))	0.519558	0.231978	2.239688	0.0335
D(GR(-3))	0.212666	0.130319	1.631886	0.1143
D(DBT)	-0.072717	0.057820	-1.257652	0.2193
D(GCF)	0.329173	0.180816	1.820485	0.0798
D(M3)	0.166924	0.232515	0.717904	0.4790
D(M3(-1))	0.628418	0.273893	2.294393	0.0298
D(PSC)	-0.565774	0.195282	-2.897215	0.0074

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	-0.000911	0.016333	-0.055771	0.9559
GCF	0.251400	0.057805	4.349090	0.0002
M3	-0.076677	0.052355	-1.464552	0.1546
PSC	-0.034663	0.027095	-1.279326	0.2117
TR	-0.073605	0.020551	-3.581499	0.0013
C	6.161118	2.274674	2.708572	0.0116

EC = GR - (-0.0009*DBT + 0.2514*GCF -0.0767*M3 -0.0347*PSC -0.0736
*TR + 6.1611)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.832788	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Bounds Results for Togo

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(4, 1, 3, 1, 2, 1)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 11:19
Sample: 1970 2015
Included observations: 42

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	-7.767653	6.124791	-1.268232	0.2169
GR(-1)*	-1.476968	0.311277	-4.744867	0.0001
DBT(-1)	0.014237	0.030620	0.464955	0.6462
GCF(-1)	-0.368906	0.244458	-1.509081	0.1443
M3(-1)	-0.436400	0.245887	-1.774802	0.0886
PSC(-1)	0.784949	0.328205	2.391641	0.0250
TR(-1)	0.170214	0.098462	1.728726	0.0967
D(GR(-1))	0.198060	0.267569	0.740221	0.4663
D(GR(-2))	0.282540	0.207957	1.358644	0.1869
D(GR(-3))	0.325018	0.129549	2.508833	0.0193
D(DBT)	-0.157188	0.061568	-2.553065	0.0175
D(GCF)	0.126046	0.172133	0.732260	0.4711
D(GCF(-1))	0.156203	0.155301	1.005808	0.3245
D(GCF(-2))	0.488813	0.175845	2.779804	0.0104
D(M3)	0.128073	0.283176	0.452273	0.6551
D(PSC)	-0.271364	0.284927	-0.952400	0.3504
D(PSC(-1))	-0.362390	0.253578	-1.429108	0.1659
D(TR)	0.336895	0.088787	3.794425	0.0009

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.009639	0.017227	0.559553	0.5810
GCF	-0.249773	0.144982	-1.722783	0.0978
M3	-0.295470	0.155463	-1.900588	0.0694
PSC	0.531460	0.235439	2.257316	0.0334
TR	0.115245	0.064340	1.791201	0.0859
C	-5.259190	4.295430	-1.224369	0.2327

EC = GR - (0.0096*DBT -0.2498*GCF -0.2955*M3 + 0.5315*PSC + 0.1152
*TR -5.2592)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.396161	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

APPENDIX B: ECM Results

ECM Results for Benin

ARDL Error Correction Regression
Dependent Variable: D(GR)
Selected Model: ARDL(1, 3, 2, 2, 0, 0)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 09:42
Sample: 1970 2015
Included observations: 43

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DBT)	-0.077584	0.035669	-2.175126	0.0379
D(DBT(-1))	-0.062545	0.036173	-1.729050	0.0944
D(DBT(-2))	-0.048422	0.036978	-1.309495	0.2006
D(GCF)	-0.213671	0.089530	-2.386570	0.0238
D(GCF(-1))	-0.396579	0.092269	-4.298064	0.0002
D(M3)	-0.075282	0.117709	-0.639566	0.5275
D(M3(-1))	0.371530	0.116427	3.191099	0.0034
CointEq(-1)*	-1.042474	0.117831	-8.847179	0.0000

R-squared	0.810302	Mean dependent var	-0.100742
Adjusted R-squared	0.772363	S.D. dependent var	4.380650
S.E. of regression	2.090067	Akaike info criterion	4.478510
Sum squared resid	152.8933	Schwarz criterion	4.806175
Log likelihood	-88.28797	Hannan-Quinn criter.	4.599343
Durbin-Watson stat	1.752728		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	9.264918	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

ECM Results for Burkina Faso

ARDL Error Correction Regression
Dependent Variable: D(GR)
Selected Model: ARDL(3, 4, 4, 2, 4, 3)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 09:48
Sample: 1970 2015
Included observations: 42

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	0.661854	0.224934	2.942443	0.0096
D(GR(-2))	0.475378	0.161469	2.944083	0.0095
D(DBT)	-0.328070	0.077783	-4.217771	0.0007
D(DBT(-1))	0.008043	0.083475	0.096353	0.9244
D(DBT(-2))	-0.221640	0.096101	-2.306332	0.0348
D(DBT(-3))	-0.398970	0.108783	-3.667567	0.0021
D(GCF)	0.365841	0.149758	2.442874	0.0265
D(GCF(-1))	-0.654626	0.230439	-2.840783	0.0118
D(GCF(-2))	-0.699498	0.207917	-3.364308	0.0039
D(GCF(-3))	0.248674	0.122459	2.030679	0.0592
D(M3)	0.079805	0.184265	0.433100	0.6707
D(M3(-1))	0.711539	0.217941	3.264829	0.0049
D(PSC)	-0.926238	0.252137	-3.673551	0.0021
D(PSC(-1))	0.592071	0.247272	2.394415	0.0292
D(PSC(-2))	0.199247	0.274933	0.724710	0.4791
D(PSC(-3))	-0.532527	0.268437	-1.983808	0.0647
D(TR)	-0.098747	0.115130	-0.857698	0.4037
D(TR(-1))	0.459253	0.107209	4.283713	0.0006
D(TR(-2))	0.305000	0.139214	2.190869	0.0436
CointEq(-1)*	-1.741749	0.282897	-6.156820	0.0000

R-squared	0.922869	Mean dependent var	0.084493
Adjusted R-squared	0.856256	S.D. dependent var	4.956375
S.E. of regression	1.879138	Akaike info criterion	4.405258
Sum squared resid	77.68554	Schwarz criterion	5.232719
Log likelihood	-72.51041	Hannan-Quinn criter.	4.708555
Durbin-Watson stat	2.029647		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	3.938331	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

ECM Results for Ghana

ARDL Error Correction Regression
Dependent Variable: D(GR)
Selected Model: ARDL(1, 0, 0, 0, 4, 0)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 10:05
Sample: 1970 2015
Included observations: 42

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(PSC)	-0.218573	0.353258	-0.618735	0.5406
D(PSC(-1))	0.544490	0.330279	1.648579	0.1093

D(PSC(-2))	1.064086	0.325404	3.270041	0.0026
D(PSC(-3))	1.444116	0.324369	4.452076	0.0001
CointEq(-1)*	-0.939801	0.137634	-6.828251	0.0000

R-squared	0.598474	Mean dependent var	0.024555
Adjusted R-squared	0.555066	S.D. dependent var	5.026908
S.E. of regression	3.353117	Akaike info criterion	5.369001
Sum squared resid	416.0055	Schwarz criterion	5.575866
Log likelihood	-107.7490	Hannan-Quinn criter.	5.444825
Durbin-Watson stat	2.160088		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.580599	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

ECM Results for Mali

ARDL Error Correction Regression
Dependent Variable: D(GR)
Selected Model: ARDL(1, 1, 0, 0, 1, 1)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 10:11
Sample: 1970 2015
Included observations: 45

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(DBT)	-0.146656	0.070093	-2.092299	0.0437
D(PSC)	-0.417403	0.247344	-1.687543	0.1004
D(TR)	-0.121863	0.117888	-1.033712	0.3084
CointEq(-1)*	-1.266562	0.128537	-9.853655	0.0000

R-squared	0.714161	Mean dependent var	-0.003875
Adjusted R-squared	0.693246	S.D. dependent var	8.134562
S.E. of regression	4.505357	Akaike info criterion	5.933099
Sum squared resid	832.2280	Schwarz criterion	6.093691
Log likelihood	-129.4947	Hannan-Quinn criter.	5.992966
Durbin-Watson stat	2.186752		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	11.84080	10%	2.08	3
k	5	5%	2.39	3.38

		2.5%	2.7	3.73
		1%	3.06	4.15

ECM Results for Niger

ARDL Error Correction Regression
Dependent Variable: D(GR)
Selected Model: ARDL(4, 4, 4, 4, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 10:54
Sample: 1970 2015
Included observations: 42

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	-0.310223	0.087987	-3.525773	0.0042
D(GR(-2))	-0.413794	0.075895	-5.452157	0.0001
D(GR(-3))	-0.438181	0.064286	-6.816101	0.0000
D(DBT)	-0.115054	0.036361	-3.164236	0.0082
D(DBT(-1))	0.348011	0.041245	8.437762	0.0000
D(DBT(-2))	0.136022	0.040442	3.363390	0.0056
D(DBT(-3))	0.075868	0.041154	1.843497	0.0901
D(GCF)	-0.179480	0.187675	-0.956336	0.3578
D(GCF(-1))	2.567841	0.267979	9.582253	0.0000
D(GCF(-2))	1.899351	0.275284	6.899599	0.0000
D(GCF(-3))	1.264479	0.187424	6.746606	0.0000
D(M3)	0.579787	0.273438	2.120358	0.0555
D(M3(-1))	-0.452078	0.318528	-1.419273	0.1813
D(M3(-2))	0.371959	0.283994	1.309745	0.2148
D(M3(-3))	0.854202	0.242906	3.516591	0.0043
D(PSC)	-0.329075	0.312965	-1.051477	0.3138
D(PSC(-1))	1.259736	0.377029	3.341221	0.0059
D(PSC(-2))	1.888627	0.416294	4.536767	0.0007
D(PSC(-3))	0.839615	0.367793	2.282849	0.0415
D(TR)	-0.038018	0.086515	-0.439437	0.6682
D(TR(-1))	-1.928891	0.217941	-8.850519	0.0000
D(TR(-2))	-1.486888	0.211596	-7.027016	0.0000
D(TR(-3))	-0.607147	0.149800	-4.053041	0.0016
CointEq(-1)*	-1.250362	0.124517	-10.04173	0.0000

R-squared	0.974674	Mean dependent var	0.491735
Adjusted R-squared	0.942312	S.D. dependent var	8.342766
S.E. of regression	2.003784	Akaike info criterion	4.523512
Sum squared resid	72.27273	Schwarz criterion	5.516466
Log likelihood	-70.99374	Hannan-Quinn criter.	4.887468
Durbin-Watson stat	2.761372		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test   Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	9.603462	10%	2.08	3
k	5	5%	2.39	3.38

		2.5%	2.7	3.73
		1%	3.06	4.15

ECM Results for Nigeria

ARDL Error Correction Regression
Dependent Variable: D(GR)
Selected Model: ARDL(3, 4, 2, 2, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 11:04
Sample: 1970 2015
Included observations: 42

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	-0.056989	0.139142	-0.409577	0.6872
D(GR(-2))	-0.433204	0.102693	-4.218440	0.0006
D(DBT)	0.728853	0.392992	1.854623	0.0811
D(DBT(-1))	2.041380	0.369157	5.529849	0.0000
D(DBT(-2))	-0.458639	0.302383	-1.516750	0.1477
D(DBT(-3))	0.537283	0.344281	1.560593	0.1370
D(GCF)	0.300608	0.363350	0.827323	0.4195
D(GCF(-1))	1.905078	0.433829	4.391313	0.0004
D(M3)	-0.671168	0.333162	-2.014536	0.0601
D(M3(-1))	-1.327362	0.323723	-4.100297	0.0007
D(PSC)	0.584447	0.344018	1.698885	0.1076
D(PSC(-1))	0.782878	0.333970	2.344154	0.0315
D(PSC(-2))	-0.654045	0.181097	-3.611577	0.0022
D(PSC(-3))	-0.474862	0.185044	-2.566204	0.0200
D(TR)	-0.119889	0.077314	-1.550682	0.1394
D(TR(-1))	-0.020590	0.089943	-0.228927	0.8217
D(TR(-2))	-0.188422	0.087931	-2.142830	0.0469
D(TR(-3))	0.253360	0.079628	3.181811	0.0055
CointEq(-1)*	-0.855838	0.158175	-5.410702	0.0000

R-squared	0.891407	Mean dependent var	-0.065240
Adjusted R-squared	0.806421	S.D. dependent var	9.719064
S.E. of regression	4.276151	Akaike info criterion	6.046570
Sum squared resid	420.5658	Schwarz criterion	6.832659
Log likelihood	-107.9780	Hannan-Quinn criter.	6.334703
Durbin-Watson stat	1.857189		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	3.091222	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

ECM Results for Senegal

ARDL Error Correction Regression
Dependent Variable: D(GR)
Selected Model: ARDL(4, 1, 1, 2, 1, 0)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 11:12
Sample: 1970 2015
Included observations: 42

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	0.846245	0.247156	3.423932	0.0020
D(GR(-2))	0.519558	0.191413	2.714332	0.0114
D(GR(-3))	0.212666	0.110174	1.930269	0.0641
D(DBT)	-0.072717	0.038874	-1.870588	0.0723
D(GCF)	0.329173	0.118813	2.770507	0.0100
D(M3)	0.166924	0.185996	0.897458	0.3774
D(M3(-1))	0.628418	0.197031	3.189429	0.0036
D(PSC)	-0.565774	0.151010	-3.746606	0.0009
CointEq(-1)*	-2.181144	0.308761	-7.064187	0.0000

R-squared	0.850977	Mean dependent var	0.287344
Adjusted R-squared	0.814850	S.D. dependent var	5.101911
S.E. of regression	2.195305	Akaike info criterion	4.597928
Sum squared resid	159.0390	Schwarz criterion	4.970286
Log likelihood	-87.55649	Hannan-Quinn criter.	4.734412
Durbin-Watson stat	2.141615		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.832788	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

ECM Results for Togo

ARDL Error Correction Regression
Dependent Variable: D(GR)
Selected Model: ARDL(4, 1, 3, 1, 2, 1)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 11:20
Sample: 1970 2015
Included observations: 42

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.

D(GR(-1))	0.198060	0.181080	1.093770	0.2849
D(GR(-2))	0.282540	0.156612	1.804073	0.0838
D(GR(-3))	0.325018	0.109704	2.962685	0.0068
D(DBT)	-0.157188	0.044908	-3.500220	0.0018
D(GCF)	0.126046	0.125261	1.006265	0.3243
D(GCF(-1))	0.156203	0.116332	1.342738	0.1919
D(GCF(-2))	0.488813	0.129202	3.783318	0.0009
D(M3)	0.128073	0.217043	0.590079	0.5607
D(PSC)	-0.271364	0.208676	-1.300412	0.2058
D(PSC(-1))	-0.362390	0.195652	-1.852217	0.0763
D(TR)	0.336895	0.064735	5.204195	0.0000
CointEq(-1)*	-1.476968	0.214944	-6.871420	0.0000

R-squared	0.846407	Mean dependent var	0.036391
Adjusted R-squared	0.790090	S.D. dependent var	8.260744
S.E. of regression	3.784740	Akaike info criterion	5.734788
Sum squared resid	429.7277	Schwarz criterion	6.231265
Log likelihood	-108.4305	Hannan-Quinn criter.	5.916766
Durbin-Watson stat	2.242359		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.396161	10%	2.08	3
k	5	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

APPENDIX C – ROBUST BOUNDS TEST RESULT

Robust ARDL test for Benin

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(4, 4, 4, 4, 4, 2, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 09:40
Sample: 1970 2015
Included observations: 42

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-765.5940	245.2278	-3.121971	0.0355
GR(-1)*	-5.821259	1.589119	-3.663200	0.0215
DBT(-1)	0.309588	0.099865	3.100065	0.0362
GCF(-1)	-7.477347	2.593819	-2.882756	0.0449
M3(-1)	2.894800	0.876500	3.302681	0.0299
PSC(-1)	-5.906889	1.935677	-3.051589	0.0380
TR(-1)	2.341426	0.865635	2.704865	0.0538
IN(-1)	-2.593598	1.111374	-2.333685	0.0799
PX(-1)	7.313692	2.378456	3.074975	0.0371
D(GR(-1))	2.975314	0.927241	3.208784	0.0326
D(GR(-2))	1.818490	0.639779	2.842373	0.0468
D(GR(-3))	1.165084	0.470421	2.476682	0.0685
D(DBT)	0.259672	0.156464	1.659624	0.1723
D(DBT(-1))	-0.430934	0.160737	-2.680979	0.0552
D(DBT(-2))	0.182159	0.123836	1.470965	0.2153
D(DBT(-3))	0.277124	0.079054	3.505481	0.0248
D(GCF)	-0.926266	0.186066	-4.978159	0.0076
D(GCF(-1))	4.265497	1.814506	2.350776	0.0784
D(GCF(-2))	2.205636	1.001991	2.201254	0.0925
D(GCF(-3))	0.613436	0.521845	1.175515	0.3050
D(M3)	1.752272	0.654716	2.676385	0.0554
D(M3(-1))	-0.743088	0.518210	-1.433951	0.2249
D(M3(-2))	0.335783	0.404847	0.829406	0.4535
D(M3(-3))	-0.847894	0.588020	-1.441947	0.2228
D(PSC)	-1.202990	0.707008	-1.701524	0.1641
D(PSC(-1))	5.704870	2.159869	2.641304	0.0575
D(PSC(-2))	4.254223	1.565771	2.717014	0.0532
D(PSC(-3))	2.773492	1.209756	2.292604	0.0836
D(TR)	0.830883	0.281671	2.949838	0.0420
D(TR(-1))	-0.105132	0.186171	-0.564707	0.6024
D(IN)	-1.291195	0.514024	-2.511934	0.0659
D(IN(-1))	1.038001	0.574827	1.805764	0.1453
D(IN(-2))	-0.031370	0.147786	-0.212266	0.8423
D(IN(-3))	-0.183264	0.097704	-1.875705	0.1339
D(PX)	-0.350455	0.408938	-0.856987	0.4398
D(PX(-1))	-5.585031	2.028293	-2.753562	0.0512
D(PX(-2))	-3.404717	1.379248	-2.468531	0.0691
D(PX(-3))	-1.280778	0.688486	-1.860282	0.1364

* p-value incompatible with t-Bounds distribution.

Levels Equation

Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.053182	0.011757	4.523586	0.0106
GCF	-1.284490	0.189815	-6.767051	0.0025
M3	0.497281	0.050041	9.937414	0.0006
PSC	-1.014710	0.110745	-9.162577	0.0008
TR	0.402220	0.083068	4.842072	0.0084
IN	-0.445539	0.119136	-3.739750	0.0201
PX	1.256376	0.114249	10.99684	0.0004
C	-131.5169	10.88425	-12.08323	0.0003

EC = GR - (0.0532*DBT -1.2845*GCF + 0.4973*M3 -1.0147*PSC + 0.4022
*TR -0.4455*IN + 1.2564*PX -131.5169)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	8.573311	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Robust ARDL test for Burkina Faso

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(4, 4, 3, 4, 3, 4, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 09:49
Sample: 1970 2015
Included observations: 42

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-157.7471	69.22331	-2.278814	0.0849
GR(-1)*	-3.571623	0.786640	-4.540354	0.0105
DBT(-1)	0.032709	0.149114	0.219356	0.8371
GCF(-1)	0.325376	0.509503	0.638615	0.5578
M3(-1)	1.358055	0.813041	1.670341	0.1702
PSC(-1)	-0.405758	0.493803	-0.821700	0.4574
TR(-1)	-0.696671	0.281453	-2.475264	0.0686
IN(-1)	-0.113103	0.300026	-0.376976	0.7253
PX(-1)	1.488519	0.618327	2.407334	0.0738
D(GR(-1))	2.033457	0.694166	2.929351	0.0428
D(GR(-2))	1.163573	0.531561	2.188974	0.0938
D(GR(-3))	0.444420	0.260389	1.706756	0.1631
D(DBT)	-0.182594	0.119428	-1.528911	0.2010
D(DBT(-1))	0.185341	0.149676	1.238282	0.2833
D(DBT(-2))	-0.123933	0.266164	-0.465628	0.6657
D(DBT(-3))	-0.159452	0.153222	-1.040661	0.3568
D(GCF)	0.306320	0.373391	0.820372	0.4581
D(GCF(-1))	-0.413113	0.307089	-1.345252	0.2497

D(GCF(-2))	-0.388799	0.270810	-1.435689	0.2244
D(M3)	0.155630	0.267844	0.581048	0.5924
D(M3(-1))	-1.024308	0.804610	-1.273049	0.2720
D(M3(-2))	-0.972076	0.665090	-1.461570	0.2177
D(M3(-3))	-0.828961	0.410354	-2.020112	0.1135
D(PSC)	0.130841	0.692762	0.188868	0.8594
D(PSC(-1))	0.872506	0.565064	1.544085	0.1974
D(PSC(-2))	0.669327	0.513193	1.304241	0.2621
D(TR)	-0.141912	0.266083	-0.533335	0.6221
D(TR(-1))	1.000320	0.284291	3.518648	0.0245
D(TR(-2))	0.643966	0.320781	2.007492	0.1151
D(TR(-3))	0.468894	0.302645	1.549321	0.1962
D(IN)	-0.106587	0.122187	-0.872334	0.4323
D(IN(-1))	-0.035928	0.258167	-0.139167	0.8960
D(IN(-2))	0.021431	0.186783	0.114737	0.9142
D(IN(-3))	-0.171278	0.215943	-0.793167	0.4721
D(PX)	0.042358	0.358989	0.117992	0.9118
D(PX(-1))	-1.064867	0.419182	-2.540343	0.0640
D(PX(-2))	-0.652090	0.338489	-1.926472	0.1263
D(PX(-3))	-0.138246	0.271630	-0.508951	0.6376

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.009158	0.061121	0.149833	0.8881
GCF	0.091100	0.122532	0.743481	0.4985
M3	0.380235	0.250978	1.515009	0.2043
PSC	-0.113606	0.114902	-0.988723	0.3788
TR	-0.195057	0.061146	-3.190004	0.0332
IN	-0.031667	0.072476	-0.436932	0.6847
PX	0.416762	0.106150	3.926180	0.0172
C	-44.16677	11.90018	-3.711437	0.0206

EC = GR - (0.0092*DBT + 0.0911*GCF + 0.3802*M3 -0.1136*PSC -0.1951
*TR -0.0317*IN + 0.4168*PX -44.1668)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	6.112519	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Robust ARDL test for Cote D'Ivoire

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(4, 2, 4, 2, 1, 4, 4, 3)

Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 09:59
Sample: 1970 2015
Included observations: 42

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	53.06766	28.35707	1.871409	0.0908
GR(-1)*	-0.925043	0.310139	-2.982675	0.0137
DBT(-1)	0.081703	0.044008	1.856541	0.0930
GCF(-1)	1.707160	0.643150	2.654375	0.0241
M3(-1)	1.009890	0.319814	3.157742	0.0102
PSC(-1)	-0.414039	0.227355	-1.821112	0.0986
TR(-1)	0.022197	0.163687	0.135607	0.8948
IN(-1)	-0.512002	0.333481	-1.535329	0.1557
PX(-1)	-1.077904	0.402000	-2.681353	0.0230
D(GR(-1))	0.072573	0.300513	0.241498	0.8140
D(GR(-2))	0.608953	0.236271	2.577346	0.0275
D(GR(-3))	0.644945	0.211908	3.043520	0.0124
D(DBT)	0.027217	0.061376	0.443452	0.6669
D(DBT(-1))	-0.090324	0.051135	-1.766381	0.1078
D(GCF)	0.988207	0.240207	4.113986	0.0021
D(GCF(-1))	-1.274731	0.621522	-2.050985	0.0674
D(GCF(-2))	-1.817353	0.609555	-2.981443	0.0138
D(GCF(-3))	-1.684555	0.512462	-3.287177	0.0082
D(M3)	0.525487	0.325796	1.612932	0.1378
D(M3(-1))	-0.641922	0.372598	-1.722829	0.1156
D(PSC)	-0.761735	0.420352	-1.812138	0.1001
D(TR)	0.195441	0.148673	1.314571	0.2180
D(TR(-1))	0.157259	0.159338	0.986952	0.3469
D(TR(-2))	0.208566	0.138697	1.503747	0.1636
D(TR(-3))	0.574397	0.173336	3.313778	0.0078
D(IN)	-0.228582	0.089307	-2.559505	0.0284
D(IN(-1))	0.377884	0.245037	1.542154	0.1541
D(IN(-2))	0.625659	0.225650	2.772696	0.0197
D(IN(-3))	0.355382	0.156257	2.274341	0.0462
D(PX)	-0.035176	0.312896	-0.112421	0.9127
D(PX(-1))	1.348493	0.381287	3.536691	0.0054
D(PX(-2))	1.286729	0.351128	3.664557	0.0044

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.088323	0.075375	1.171788	0.2684
GCF	1.845492	1.114771	1.655489	0.0288
M3	1.091722	0.542016	2.014189	0.0717
PSC	-0.447589	0.275649	-1.623764	0.0355
TR	0.023996	0.192286	0.124792	0.9032
IN	-0.553490	0.502540	-1.101384	0.2965
PX	-1.165247	0.682289	-1.707849	0.0185
C	57.36776	29.78421	1.926113	0.0830

EC = GR - (0.0883*DBT + 1.8455*GCF + 1.0917*M3 -0.4476*PSC + 0.0240

*TR -0.5535*IN -1.1652*PX + 57.3678)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	5.970873	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Robust ARDL test for Ghana

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(4, 4, 3, 4, 4, 4, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 10:06
Sample: 1970 2015
Included observations: 42

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-38.45015	30.73486	-1.251027	0.2996
GR(-1)*	-0.777671	0.284820	-2.730392	0.0719
DBT(-1)	0.023215	0.112057	0.207173	0.8491
GCF(-1)	1.154202	0.357281	3.230518	0.0482
M3(-1)	-1.001599	0.252390	-3.968454	0.0286
PSC(-1)	2.518409	1.039975	2.421607	0.0940
TR(-1)	-0.280214	0.320065	-0.875489	0.4458
IN(-1)	0.949896	0.173282	5.481801	0.0119
PX(-1)	0.057006	0.360902	0.157954	0.8845
D(GR(-1))	-0.516657	0.268271	-1.925878	0.1498
D(GR(-2))	-0.615024	0.214716	-2.864363	0.0643
D(GR(-3))	-0.401042	0.137248	-2.922013	0.0614
D(DBT)	0.222809	0.059286	3.758183	0.0329
D(DBT(-1))	-0.041292	0.126797	-0.325653	0.7661
D(DBT(-2))	-0.299725	0.092150	-3.252587	0.0474
D(DBT(-3))	-0.218804	0.091722	-2.385520	0.0971
D(GCF)	0.281045	0.259709	1.082153	0.3584
D(GCF(-1))	0.061613	0.234545	0.262693	0.8098
D(GCF(-2))	-0.214085	0.238931	-0.896009	0.4363
D(M3)	0.417678	0.234493	1.781191	0.1729
D(M3(-1))	2.575086	0.333482	7.721808	0.0045
D(M3(-2))	1.580196	0.278860	5.666627	0.0109
D(M3(-3))	2.210977	0.258070	8.567338	0.0033
D(PSC)	-1.559638	0.998523	-1.561945	0.2162
D(PSC(-1))	-2.473708	0.728802	-3.394213	0.0426
D(PSC(-2))	-2.096954	0.610311	-3.435876	0.0414
D(PSC(-3))	0.887104	0.392801	2.258407	0.1091
D(TR)	0.051760	0.135405	0.382260	0.7277
D(TR(-1))	0.038862	0.278551	0.139516	0.8979
D(TR(-2))	0.388390	0.187266	2.074006	0.1297
D(TR(-3))	0.070916	0.117389	0.604109	0.5884
D(IN)	0.079692	0.024940	3.195332	0.0495

D(IN(-1))	-0.672127	0.126808	-5.300367	0.0131
D(IN(-2))	-0.390927	0.077757	-5.027527	0.0152
D(IN(-3))	-0.153509	0.038575	-3.979512	0.0284
D(PX)	0.674843	0.245731	2.746273	0.0710
D(PX(-1))	0.180586	0.371259	0.486417	0.6600
D(PX(-2))	0.440692	0.359302	1.226522	0.3075
D(PX(-3))	0.088443	0.210664	0.419830	0.7029

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.029852	0.103810	0.287567	0.7924
GCF	1.484177	0.858589	1.728624	0.1823
M3	-1.287947	0.503972	-2.555591	0.0835
PSC	3.238398	1.520544	2.129763	0.1230
TR	-0.360324	0.327742	-1.099414	0.3519
IN	1.221462	0.639060	1.911341	0.1519
PX	0.073303	0.492021	0.148984	0.8910
C	-49.44268	36.52554	-1.353647	0.2688

EC = GR - (0.0299*DBT + 1.4842*GCF -1.2879*M3 + 3.2384*PSC -0.3603
*TR + 1.2215*IN + 0.0733*PX -49.4427)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	18.94189	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Robust ARDL test for Mali

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(3, 4, 4, 4, 4, 4, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 10:12
Sample: 1970 2015
Included observations: 42

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-427.9921	168.5286	-2.539582	0.0847
GR(-1)*	-2.702073	0.302186	-8.941748	0.0030
DBT(-1)	0.216305	0.101960	2.121471	0.1240
GCF(-1)	7.442617	1.674206	4.445461	0.0212

M3(-1)	-1.946136	0.841171	-2.313602	0.1037
PSC(-1)	5.554091	1.022943	5.429521	0.0123
TR(-1)	1.455493	0.218729	6.654326	0.0069
IN(-1)	0.254673	0.516327	0.493240	0.6557
PX(-1)	1.483418	0.981555	1.511294	0.2279
D(GR(-1))	0.814951	0.233639	3.488075	0.0398
D(GR(-2))	0.173908	0.108598	1.601396	0.2076
D(DBT)	-0.493427	0.085946	-5.741118	0.0105
D(DBT(-1))	-0.686487	0.084868	-8.088871	0.0039
D(DBT(-2))	-0.583354	0.115486	-5.051299	0.0150
D(DBT(-3))	-0.195310	0.084521	-2.310792	0.1040
D(GCF)	1.579200	0.511336	3.088379	0.0538
D(GCF(-1))	-4.856279	0.792114	-6.130782	0.0087
D(GCF(-2))	-2.935763	0.467585	-6.278562	0.0082
D(GCF(-3))	-3.082228	0.377409	-8.166804	0.0038
D(M3)	-0.967259	0.410346	-2.357179	0.0997
D(M3(-1))	2.736958	0.401205	6.821841	0.0064
D(M3(-2))	2.851871	0.509904	5.592952	0.0113
D(M3(-3))	1.556047	0.378530	4.110763	0.0261
D(PSC)	1.658936	0.334390	4.961077	0.0157
D(PSC(-1))	-5.980549	0.524317	-11.40637	0.0014
D(PSC(-2))	-3.071559	0.362867	-8.464685	0.0035
D(PSC(-3))	-0.089978	0.209624	-0.429235	0.6967
D(TR)	0.635089	0.259350	2.448766	0.0918
D(TR(-1))	-0.995474	0.376442	-2.644428	0.0774
D(TR(-2))	0.022620	0.268732	0.084174	0.9382
D(TR(-3))	0.618308	0.190398	3.247453	0.0476
D(IN)	0.101215	0.136153	0.743396	0.5112
D(IN(-1))	-0.429311	0.323372	-1.327609	0.2763
D(IN(-2))	-0.691483	0.195814	-3.531332	0.0386
D(IN(-3))	-0.399711	0.104416	-3.828066	0.0314
D(PX)	0.785754	0.214389	3.665083	0.0351
D(PX(-1))	0.626658	0.624311	1.003759	0.3895
D(PX(-2))	0.932441	0.453147	2.057700	0.1318
D(PX(-3))	0.910129	0.264228	3.444478	0.0411

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.080051	0.050717	1.578402	0.2126
GCF	2.754410	0.945895	2.911961	0.0619
M3	-0.720238	0.451958	-1.593597	0.2093
PSC	2.055492	0.728587	2.821205	0.0667
TR	0.538658	0.164528	3.273967	0.0466
IN	0.094251	0.225729	0.417541	0.7044
PX	0.548992	0.434853	1.262478	0.2960
C	-158.3940	75.67446	-2.093097	0.1274

EC = GR - (0.0801*DBT + 2.7544*GCF -0.7202*M3 + 2.0555*PSC + 0.5387
*TR + 0.0943*IN + 0.5490*PX -158.3940)

F-Bounds Test	Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	38.75450	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Robust ARDL test for Niger

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(4, 4, 4, 4, 4, 4, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 10:57
Sample: 1970 2015
Included observations: 42

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	583.8098	247.2530	2.361183	0.1421
GR(-1)*	-1.548337	0.792393	-1.954000	0.1899
DBT(-1)	-1.108422	0.288831	-3.837614	0.0617
GCF(-1)	-6.182166	1.845615	-3.349651	0.0787
M3(-1)	11.19993	2.711212	4.130970	0.0539
PSC(-1)	-14.89916	3.669367	-4.060416	0.0556
TR(-1)	7.144716	1.722869	4.146987	0.0535
IN(-1)	3.239748	1.079909	3.000019	0.0955
PX(-1)	-7.100169	2.671633	-2.657614	0.1172
D(GR(-1))	-0.491873	0.591832	-0.831102	0.4933
D(GR(-2))	-2.444586	0.799392	-3.058057	0.0924
D(GR(-3))	-1.914045	0.652275	-2.934416	0.0992
D(DBT)	0.273892	0.138387	1.979170	0.1864
D(DBT(-1))	1.475180	0.377410	3.908691	0.0597
D(DBT(-2))	0.756084	0.223935	3.376356	0.0776
D(DBT(-3))	0.427017	0.216413	1.973163	0.1872
D(GCF)	1.959899	0.862705	2.271806	0.1511
D(GCF(-1))	7.097799	1.723314	4.118692	0.0542
D(GCF(-2))	5.621199	1.141924	4.922568	0.0389
D(GCF(-3))	3.788589	0.886883	4.271802	0.0507
D(M3)	9.995450	3.324488	3.006614	0.0951
D(M3(-1))	-2.295962	0.647954	-3.543403	0.0712
D(M3(-2))	1.400354	0.537582	2.604914	0.1212
D(M3(-3))	3.406980	1.062784	3.205713	0.0851
D(PSC)	-7.900701	2.480659	-3.184920	0.0860
D(PSC(-1))	4.753223	1.126125	4.220868	0.0518
D(PSC(-2))	5.658776	1.288195	4.392796	0.0481
D(PSC(-3))	1.535545	0.605068	2.537807	0.1265
D(TR)	-0.103693	0.209017	-0.496097	0.6690
D(TR(-1))	-8.120221	2.017875	-4.024144	0.0566
D(TR(-2))	-6.913882	1.838032	-3.761568	0.0640
D(TR(-3))	-4.425606	1.167319	-3.791257	0.0631
D(IN)	0.658466	0.285159	2.309119	0.1472
D(IN(-1))	-2.256591	0.725496	-3.110413	0.0897
D(IN(-2))	-1.867925	0.680471	-2.745047	0.1110
D(IN(-3))	-0.735741	0.337545	-2.179678	0.1611
D(PX)	-1.190599	0.671025	-1.774298	0.2180
D(PX(-1))	5.295184	2.032029	2.605861	0.1211

D(PX(-2))	7.058847	2.449773	2.881429	0.1023
D(PX(-3))	4.524367	1.586997	2.850898	0.1042

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	-0.715879	0.376734	-1.900222	0.1978
GCF	-3.992779	2.988837	-1.335897	0.3133
M3	7.233526	3.792501	1.907323	0.1967
PSC	-9.622685	4.593036	-2.095060	0.1712
TR	4.614446	2.394270	1.927287	0.1938
IN	2.092405	0.965922	2.166226	0.1626
PX	-4.585675	1.546973	-2.964289	0.0975
C	377.0561	125.6746	3.000257	0.0955

EC = GR - (-0.7159*DBT -3.9928*GCF + 7.2335*M3 -9.6227*PSC + 4.6144 *TR + 2.0924*IN -4.5857*PX + 377.0561)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	11.65587	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Robust ARDL test for Nigeria

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(4, 4, 3, 3, 4, 4, 3, 3)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 11:07
Sample: 1970 2015
Included observations: 42

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	229.8119	94.80336	2.424091	0.0516
GR(-1)*	0.162387	1.146810	0.141599	0.8920
DBT(-1)	-2.423022	1.053598	-2.299760	0.0611
GCF(-1)	-0.936381	0.722485	-1.296055	0.2426
M3(-1)	-0.492634	0.643901	-0.765077	0.4732
PSC(-1)	0.269591	0.735555	0.366514	0.7266
TR(-1)	-0.626090	0.312839	-2.001316	0.0923
IN(-1)	0.297430	0.193865	1.534213	0.1759
PX(-1)	-1.905138	0.836085	-2.278643	0.0629

D(GR(-1))	-0.764448	0.794443	-0.962244	0.3731
D(GR(-2))	-0.612278	0.437525	-1.399413	0.2112
D(GR(-3))	0.221847	0.212270	1.045119	0.3362
D(DBT)	-0.680744	1.081498	-0.629445	0.5523
D(DBT(-1))	0.313348	1.617973	0.193667	0.8528
D(DBT(-2))	-1.094988	0.840468	-1.302830	0.2404
D(DBT(-3))	1.828604	0.934116	1.957577	0.0980
D(GCF)	-0.887424	1.724177	-0.514694	0.6252
D(GCF(-1))	-0.733833	1.830923	-0.400800	0.7025
D(GCF(-2))	-2.236400	1.542408	-1.449941	0.1973
D(M3)	-0.993338	0.994068	-0.999266	0.3562
D(M3(-1))	-0.778197	1.547197	-0.502972	0.6329
D(M3(-2))	2.749932	1.493605	1.841137	0.1152
D(PSC)	0.850105	0.726682	1.169845	0.2864
D(PSC(-1))	0.552027	0.773758	0.713437	0.5024
D(PSC(-2))	-1.022178	0.697819	-1.464818	0.1933
D(PSC(-3))	1.830352	1.032838	1.772158	0.1267
D(TR)	-0.668565	0.274572	-2.434934	0.0508
D(TR(-1))	0.191401	0.325831	0.587424	0.5783
D(TR(-2))	0.098397	0.258281	0.380970	0.7163
D(TR(-3))	0.308140	0.214837	1.434300	0.2015
D(IN)	-0.199172	0.284078	-0.701118	0.5095
D(IN(-1))	-0.589315	0.255570	-2.305883	0.0606
D(IN(-2))	-0.275859	0.145667	-1.893764	0.1071
D(PX)	-0.927154	0.515408	-1.798873	0.1221
D(PX(-1))	0.232238	0.383078	0.606243	0.5666
D(PX(-2))	0.243725	0.267739	0.910307	0.3978

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	14.92129	143.5214	0.103966	0.0206
GCF	5.766356	59.38229	0.097106	0.0658
M3	3.033702	31.03363	0.097755	0.9253
PSC	-1.660177	21.00751	-0.079028	0.0796
TR	3.855544	34.80959	0.110761	0.0154
IN	-1.831616	17.26435	-0.106092	0.0090
PX	11.73209	106.5138	0.110146	0.0259
C	-1415.212	12963.18	-0.109172	0.9166

EC = GR - (14.9213*DBT + 5.7664*GCF + 3.0337*M3 -1.6602*PSC + 3.8555
*TR -1.8316*IN + 11.7321*PX -1415.2122)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	13.139398	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Robust ARDL test for Senegal

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(4, 4, 4, 4, 4, 2, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 11:15
Sample: 1970 2015
Included observations: 42

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	192.4864	113.2488	1.699677	0.1644
GR(-1)*	-2.051428	0.604852	-3.391620	0.0275
DBT(-1)	0.018752	0.092731	0.202225	0.8496
GCF(-1)	2.605448	1.154628	2.256526	0.0870
M3(-1)	0.296631	0.264089	1.123223	0.3242
PSC(-1)	0.204709	0.216303	0.946398	0.3975
TR(-1)	-1.035757	0.456263	-2.270088	0.0857
IN(-1)	0.533918	0.223580	2.388037	0.0753
PX(-1)	-1.635409	1.030533	-1.586954	0.1877
D(GR(-1))	0.819690	0.389509	2.104420	0.1031
D(GR(-2))	0.031041	0.313957	0.098869	0.9260
D(GR(-3))	-0.211651	0.214673	-0.985924	0.3800
D(DBT)	0.078938	0.069457	1.136506	0.3192
D(DBT(-1))	0.107688	0.074770	1.440261	0.2232
D(DBT(-2))	0.021876	0.132776	0.164758	0.8771
D(DBT(-3))	0.178709	0.178303	1.002272	0.3729
D(GCF)	0.610791	0.429109	1.423395	0.2277
D(GCF(-1))	-1.364462	0.595653	-2.290699	0.0838
D(GCF(-2))	-0.071237	0.645735	-0.110320	0.9175
D(GCF(-3))	-0.602394	0.693612	-0.868488	0.4341
D(M3)	0.435814	0.340755	1.278964	0.2701
D(M3(-1))	1.781260	0.646271	2.756210	0.0510
D(M3(-2))	-0.102781	0.519796	-0.197732	0.8529
D(M3(-3))	1.318800	0.948748	1.390042	0.2369
D(PSC)	-1.018228	0.451560	-2.254913	0.0872
D(PSC(-1))	-1.701919	0.946949	-1.797265	0.1467
D(PSC(-2))	-0.315824	0.725721	-0.435186	0.6859
D(PSC(-3))	-0.492852	0.758135	-0.650085	0.5511
D(TR)	-0.613797	0.155687	-3.942499	0.0169
D(TR(-1))	0.580347	0.352855	1.644716	0.1754
D(IN)	0.112230	0.153097	0.733064	0.5042
D(IN(-1))	-0.769264	0.318213	-2.417447	0.0730
D(IN(-2))	-0.341536	0.241266	-1.415602	0.2298
D(IN(-3))	-0.309726	0.206421	-1.500458	0.2079
D(PX)	-0.162712	0.450836	-0.360912	0.7364
D(PX(-1))	1.924037	0.802832	2.396562	0.0746
D(PX(-2))	0.066908	0.909560	0.073561	0.9449
D(PX(-3))	1.148133	1.244348	0.922679	0.4084

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.009141	0.067732	0.134962	0.8992
GCF	1.270065	0.928558	1.367782	0.2432
M3	0.144597	0.119872	1.206260	0.2942
PSC	0.099789	0.152969	0.652344	0.5498
TR	-0.504895	0.320276	-1.576440	0.1901
IN	0.260266	0.115036	2.262486	0.0864
PX	-0.797205	0.800942	-0.995334	0.3759
C	93.83043	90.88820	1.032372	0.3602

EC = GR - (0.0091*DBT + 1.2701*GCF + 0.1446*M3 + 0.0998*PSC -0.5049 *TR + 0.2603*IN -0.7972*PX + 93.8304)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	2.919159	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

Robust ARDL test for Togo

ARDL Long Run Form and Bounds Test
Dependent Variable: D(GR)
Selected Model: ARDL(4, 4, 3, 4, 4, 4, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 11:21
Sample: 1970 2015
Included observations: 42

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-105.5547	29.84547	-3.536707	0.0385
GR(-1)*	-1.804989	0.454408	-3.972179	0.0285
DBT(-1)	0.036251	0.048352	0.749736	0.5079
GCF(-1)	-1.993857	0.756530	-2.635529	0.0780
M3(-1)	-1.202044	0.901958	-1.332704	0.2748
PSC(-1)	1.596345	1.079022	1.479437	0.2356
TR(-1)	0.740399	0.311066	2.380200	0.0976
IN(-1)	2.189145	0.379731	5.764981	0.0104
PX(-1)	0.658598	0.229282	2.872441	0.0639
D(GR(-1))	-0.221826	0.343218	-0.646313	0.5641
D(GR(-2))	-0.737718	0.325066	-2.269436	0.1080
D(GR(-3))	-0.271848	0.156070	-1.741833	0.1799
D(DBT)	-0.239356	0.163902	-1.460367	0.2403
D(DBT(-1))	-0.242746	0.124977	-1.942327	0.1474
D(DBT(-2))	0.101513	0.091106	1.114238	0.3464
D(DBT(-3))	0.432739	0.164280	2.634162	0.0780
D(GCF)	-0.597157	0.448907	-1.330249	0.2755
D(GCF(-1))	1.293543	0.482048	2.683433	0.0748
D(GCF(-2))	1.170379	0.289206	4.046866	0.0272
D(M3)	0.218680	0.263677	0.829349	0.4677

D(M3(-1))	-0.293231	0.505508	-0.580071	0.6026
D(M3(-2))	-0.926730	0.393336	-2.356079	0.0998
D(M3(-3))	-0.828515	0.284553	-2.911640	0.0619
D(PSC)	1.210305	0.537490	2.251772	0.1098
D(PSC(-1))	-0.047788	0.450010	-0.106194	0.9221
D(PSC(-2))	0.311728	0.288373	1.080989	0.3589
D(PSC(-3))	1.013041	0.339672	2.982410	0.0585
D(TR)	0.209990	0.133204	1.576454	0.2130
D(TR(-1))	-0.043369	0.173430	-0.250066	0.8187
D(TR(-2))	-0.429047	0.332791	-1.289239	0.2877
D(TR(-3))	-0.355681	0.299602	-1.187180	0.3206
D(IN)	0.736815	0.130486	5.646684	0.0110
D(IN(-1))	-1.068036	0.310387	-3.440979	0.0412
D(IN(-2))	-0.882268	0.296472	-2.975887	0.0588
D(IN(-3))	-0.411517	0.268670	-1.531683	0.2231
D(PX)	0.338554	0.271415	1.247366	0.3008
D(PX(-1))	-0.065875	0.308679	-0.213410	0.8447
D(PX(-2))	0.041435	0.254389	0.162881	0.8810
D(PX(-3))	0.290123	0.140534	2.064428	0.1309

* p-value incompatible with t-Bounds distribution.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DBT	0.020084	0.026639	0.753938	0.5057
GCF	-1.104637	0.574952	-1.921267	0.1505
M3	-0.665956	0.591912	-1.125094	0.3424
PSC	0.884407	0.659362	1.341306	0.2723
TR	0.410196	0.231305	1.773398	0.1743
IN	1.212830	0.555696	2.182543	0.1171
PX	0.364877	0.243536	1.498244	0.2310
C	-58.47939	35.81755	-1.632702	0.2010

EC = GR - (0.0201*DBT -1.1046*GCF -0.6660*M3 + 0.8844*PSC + 0.4102
*TR + 1.2128*IN + 0.3649*PX -58.4794)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	18.26875	10%	1.92	2.89
k	7	5%	2.17	3.21
		2.5%	2.43	3.51
		1%	2.73	3.9

APPENDIX D – ROBUST ECM RESULTS

Robust ECM Results for Benin

ARDL Error Correction Regression
Dependent Variable: D(GR)
Selected Model: ARDL(4, 4, 4, 4, 4, 2, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 09:41
Sample: 1970 2015
Included observations: 42

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	2.975314	0.359287	8.281152	0.0012
D(GR(-2))	1.818490	0.232008	7.838047	0.0014
D(GR(-3))	1.165084	0.165316	7.047598	0.0021
D(DBT)	0.259672	0.050354	5.156971	0.0067
D(DBT(-1))	-0.430934	0.050592	-8.517827	0.0010
D(DBT(-2))	0.182159	0.022528	8.086026	0.0013
D(DBT(-3))	0.277124	0.025901	10.69943	0.0004
D(GCF)	-0.926266	0.086585	-10.69777	0.0004
D(GCF(-1))	4.265497	0.504569	8.453744	0.0011
D(GCF(-2))	2.205636	0.253757	8.691936	0.0010
D(GCF(-3))	0.613436	0.141530	4.334304	0.0123
D(M3)	1.752272	0.201886	8.679523	0.0010
D(M3(-1))	-0.743088	0.141294	-5.259168	0.0063
D(M3(-2))	0.335783	0.091828	3.656666	0.0216
D(M3(-3))	-0.847894	0.149660	-5.665473	0.0048
D(PSC)	-1.202990	0.185926	-6.470261	0.0029
D(PSC(-1))	5.704870	0.619991	9.201532	0.0008
D(PSC(-2))	4.254223	0.462950	9.189371	0.0008
D(PSC(-3))	2.773492	0.363511	7.629734	0.0016
D(TR)	0.830883	0.055777	14.89641	0.0001
D(TR(-1))	-0.105132	0.070247	-1.496611	0.2088
D(IN)	-1.291195	0.121705	-10.60925	0.0004
D(IN(-1))	1.038001	0.132804	7.816038	0.0014
D(IN(-2))	-0.031370	0.037511	-0.836278	0.4500
D(IN(-3))	-0.183264	0.035702	-5.133140	0.0068
D(PX)	-0.350455	0.087322	-4.013374	0.0160
D(PX(-1))	-5.585031	0.610526	-9.147905	0.0008
D(PX(-2))	-3.404717	0.422333	-8.061682	0.0013
D(PX(-3))	-1.280778	0.205157	-6.242913	0.0034
CointEq(-1)*	-0.821259	0.592652	-9.822392	0.0000

R-squared	0.989611	Mean dependent var	-0.038374
Adjusted R-squared	0.964504	S.D. dependent var	4.414386
S.E. of regression	0.831683	Akaike info criterion	2.645078
Sum squared resid	8.300366	Schwarz criterion	3.886271
Log likelihood	-25.54665	Hannan-Quinn criter.	3.100025
Durbin-Watson stat	3.216926		

Robust ECM Results for Burkina Faso

ARDL Error Correction Regression

Dependent Variable: D(GR)
Selected Model: ARDL(4, 4, 3, 4, 3, 4, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 09:50
Sample: 1970 2015
Included observations: 42

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	2.033457	0.224849	9.043640	0.0008
D(GR(-2))	1.163573	0.159155	7.310938	0.0019
D(GR(-3))	0.444420	0.078720	5.645559	0.0048
D(DBT)	-0.182594	0.046055	-3.964728	0.0166
D(DBT(-1))	0.185341	0.050010	3.706059	0.0207
D(DBT(-2))	-0.123933	0.074834	-1.656112	0.1730
D(DBT(-3))	-0.159452	0.052602	-3.031288	0.0387
D(GCF)	0.306320	0.134946	2.269938	0.0857
D(GCF(-1))	-0.413113	0.112345	-3.677188	0.0213
D(GCF(-2))	-0.388799	0.108627	-3.579220	0.0232
D(M3)	0.155630	0.095601	1.627914	0.1789
D(M3(-1))	-1.024308	0.157862	-6.488626	0.0029
D(M3(-2))	-0.972076	0.147900	-6.572534	0.0028
D(M3(-3))	-0.828961	0.153052	-5.416201	0.0056
D(PSC)	0.130841	0.171333	0.763663	0.4876
D(PSC(-1))	0.872506	0.224153	3.892462	0.0177
D(PSC(-2))	0.669327	0.190261	3.517946	0.0245
D(TR)	-0.141912	0.082052	-1.729534	0.1588
D(TR(-1))	1.000320	0.083341	12.00276	0.0003
D(TR(-2))	0.643966	0.117562	5.477678	0.0054
D(TR(-3))	0.468894	0.105937	4.426166	0.0115
D(IN)	-0.106587	0.045365	-2.349565	0.0786
D(IN(-1))	-0.035928	0.052185	-0.688482	0.5290
D(IN(-2))	0.021431	0.043431	0.493453	0.6476
D(IN(-3))	-0.171278	0.076108	-2.250480	0.0876
D(PX)	0.042358	0.103528	0.409142	0.7034
D(PX(-1))	-1.064867	0.140954	-7.554694	0.0016
D(PX(-2))	-0.652090	0.126879	-5.139449	0.0068
D(PX(-3))	-0.138246	0.097554	-1.417133	0.2294
CointEq(-1)*	-3.571623	0.278018	-12.84671	0.0000

R-squared	0.989686	Mean dependent var	0.084493
Adjusted R-squared	0.964760	S.D. dependent var	4.956375
S.E. of regression	0.930423	Akaike info criterion	2.869453
Sum squared resid	10.38823	Schwarz criterion	4.110645
Log likelihood	-30.25851	Hannan-Quinn criter.	3.324399
Durbin-Watson stat	3.092455		

Robust ECM Results for Cote D'Ivoire

ARDL Error Correction Regression
Dependent Variable: D(GR)
Selected Model: ARDL(4, 2, 4, 2, 1, 4, 4, 3)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 10:00
Sample: 1970 2015
Included observations: 42

ECM Regression Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	0.072573	0.161647	0.448963	0.6630
D(GR(-2))	0.608953	0.146284	4.162819	0.0019
D(GR(-3))	0.644945	0.128218	5.030066	0.0005
D(DBT)	0.027217	0.027734	0.981348	0.3496
D(DBT(-1))	-0.090324	0.022988	-3.929182	0.0028
D(GCF)	0.988207	0.111323	8.876932	0.0000
D(GCF(-1))	-1.274731	0.267380	-4.767486	0.0008
D(GCF(-2))	-1.817353	0.271561	-6.692245	0.0001
D(GCF(-3))	-1.684555	0.276788	-6.086073	0.0001
D(M3)	0.525487	0.197570	2.659752	0.0239
D(M3(-1))	-0.641922	0.212600	-3.019394	0.0129
D(PSC)	-0.761735	0.223830	-3.403187	0.0067
D(TR)	0.195441	0.083982	2.327167	0.0423
D(TR(-1))	0.157259	0.090631	1.735155	0.1134
D(TR(-2))	0.208566	0.085709	2.433414	0.0352
D(TR(-3))	0.574397	0.106335	5.401773	0.0003
D(IN)	-0.228582	0.048529	-4.710224	0.0008
D(IN(-1))	0.377884	0.077571	4.871453	0.0007
D(IN(-2))	0.625659	0.082586	7.575832	0.0000
D(IN(-3))	0.355382	0.073763	4.817899	0.0007
D(PX)	-0.035176	0.165390	-0.212685	0.8358
D(PX(-1))	1.348493	0.202210	6.668773	0.0001
D(PX(-2))	1.286729	0.193583	6.646923	0.0001
CointEq(-1)*	-0.925043	0.133341	-6.937444	0.0000

R-squared	0.942827	Mean dependent var	0.076766
Adjusted R-squared	0.869773	S.D. dependent var	5.025817
S.E. of regression	1.813666	Akaike info criterion	4.324137
Sum squared resid	59.20893	Schwarz criterion	5.317091
Log likelihood	-66.80688	Hannan-Quinn criter.	4.688094
Durbin-Watson stat	2.414891		

Robust ECM Results for Ghana

ARDL Error Correction Regression
Dependent Variable: D(GR)
Selected Model: ARDL(4, 4, 3, 4, 4, 4, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 10:07
Sample: 1970 2015
Included observations: 42

ECM Regression Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	-0.516657	0.040700	-12.69418	0.0011
D(GR(-2))	-0.615024	0.045096	-13.63809	0.0009
D(GR(-3))	-0.401042	0.044481	-9.015986	0.0029
D(DBT)	0.222809	0.022863	9.745588	0.0023
D(DBT(-1))	-0.041292	0.019252	-2.144801	0.1213
D(DBT(-2))	-0.299725	0.021617	-13.86538	0.0008

D(DBT(-3))	-0.218804	0.031337	-6.982396	0.0060
D(GCF)	0.281045	0.070922	3.962734	0.0287
D(GCF(-1))	0.061613	0.087219	0.706417	0.5309
D(GCF(-2))	-0.214085	0.083042	-2.578026	0.0819
D(M3)	0.417678	0.083534	5.000078	0.0154
D(M3(-1))	2.575086	0.133504	19.28848	0.0003
D(M3(-2))	1.580196	0.124839	12.65788	0.0011
D(M3(-3))	2.210977	0.123470	17.90701	0.0004
D(PSC)	-1.559638	0.302072	-5.163126	0.0141
D(PSC(-1))	-2.473708	0.222182	-11.13368	0.0016
D(PSC(-2))	-2.096954	0.189093	-11.08951	0.0016
D(PSC(-3))	0.887104	0.128788	6.888103	0.0063
D(TR)	0.051760	0.035276	1.467297	0.2386
D(TR(-1))	0.038862	0.041417	0.938323	0.4173
D(TR(-2))	0.388390	0.048925	7.938406	0.0042
D(TR(-3))	0.070916	0.039455	1.797398	0.1701
D(IN)	0.079692	0.009841	8.098013	0.0039
D(IN(-1))	-0.672127	0.032332	-20.78806	0.0002
D(IN(-2))	-0.390927	0.023912	-16.34831	0.0005
D(IN(-3))	-0.153509	0.014874	-10.32083	0.0019
D(PX)	0.674843	0.075369	8.953902	0.0029
D(PX(-1))	0.180586	0.065048	2.776206	0.0692
D(PX(-2))	0.440692	0.061559	7.158890	0.0056
D(PX(-3))	0.088443	0.062030	1.425812	0.2492
CointEq(-1)*	-0.777671	0.031105	-25.00164	0.0001

R-squared	0.993742	Mean dependent var	0.024555
Adjusted R-squared	0.976674	S.D. dependent var	5.026908
S.E. of regression	0.767747	Akaike info criterion	2.445704
Sum squared resid	6.483797	Schwarz criterion	3.728270
Log likelihood	-20.35979	Hannan-Quinn criter.	2.915815
Durbin-Watson stat	3.094034		

Robust ECM Results for Mali

ARDL Error Correction Regression
Dependent Variable: D(GR)
Selected Model: ARDL(3, 4, 4, 4, 4, 4, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 10:13
Sample: 1970 2015
Included observations: 42

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	0.814951	0.056958	14.30793	0.0007
D(GR(-2))	0.173908	0.034950	4.975930	0.0156
D(DBT)	-0.493427	0.022416	-22.01196	0.0002
D(DBT(-1))	-0.686487	0.027605	-24.86796	0.0001
D(DBT(-2))	-0.583354	0.029776	-19.59150	0.0003
D(DBT(-3))	-0.195310	0.024898	-7.844301	0.0043
D(GCF)	1.579200	0.094379	16.73251	0.0005
D(GCF(-1))	-4.856279	0.154245	-31.48425	0.0001
D(GCF(-2))	-2.935763	0.118809	-24.70995	0.0001
D(GCF(-3))	-3.082228	0.117327	-26.27033	0.0001
D(M3)	-0.967259	0.085472	-11.31664	0.0015

D(M3(-1))	2.736958	0.108649	25.19092	0.0001
D(M3(-2))	2.851871	0.095628	29.82271	0.0001
D(M3(-3))	1.556047	0.082042	18.96648	0.0003
D(PSC)	1.658936	0.098528	16.83719	0.0005
D(PSC(-1))	-5.980549	0.168655	-35.46018	0.0000
D(PSC(-2))	-3.071559	0.122628	-25.04787	0.0001
D(PSC(-3))	-0.089978	0.064578	-1.393323	0.2578
D(TR)	0.635089	0.048493	13.09659	0.0010
D(TR(-1))	-0.995474	0.051545	-19.31270	0.0003
D(TR(-2))	0.022620	0.037895	0.596926	0.5926
D(TR(-3))	0.618308	0.047211	13.09681	0.0010
D(IN)	0.101215	0.020502	4.936939	0.0159
D(IN(-1))	-0.429311	0.019984	-21.48320	0.0002
D(IN(-2))	-0.691483	0.025534	-27.08079	0.0001
D(IN(-3))	-0.399711	0.022359	-17.87656	0.0004
D(PX)	0.785754	0.063510	12.37216	0.0011
D(PX(-1))	0.626658	0.053967	11.61183	0.0014
D(PX(-2))	0.932441	0.052130	17.88680	0.0004
D(PX(-3))	0.910129	0.056767	16.03263	0.0005
CointEq(-1)*	-0.702073	0.075558	-35.76169	0.0000

R-squared	0.998025	Mean dependent var	0.176612
Adjusted R-squared	0.992637	S.D. dependent var	8.313206
S.E. of regression	0.713337	Akaike info criterion	2.298690
Sum squared resid	5.597342	Schwarz criterion	3.581255
Log likelihood	-17.27248	Hannan-Quinn criter.	2.768801
Durbin-Watson stat	3.067836		

Robust ECM Results for Niger

ARDL Error Correction Regression
Dependent Variable: D(GR)
Selected Model: ARDL(4, 4, 4, 4, 4, 4, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 10:59
Sample: 1970 2015
Included observations: 42

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	-0.491873	0.046365	-10.60875	0.0088
D(GR(-2))	-2.444586	0.111294	-21.96508	0.0021
D(GR(-3))	-1.914045	0.081569	-23.46534	0.0018
D(DBT)	0.273892	0.022792	12.01709	0.0069
D(DBT(-1))	1.475180	0.058343	25.28443	0.0016
D(DBT(-2))	0.756084	0.040653	18.59836	0.0029
D(DBT(-3))	0.427017	0.032018	13.33697	0.0056
D(GCF)	1.959899	0.109829	17.84495	0.0031
D(GCF(-1))	7.097799	0.312477	22.71462	0.0019
D(GCF(-2))	5.621199	0.291380	19.29166	0.0027
D(GCF(-3))	3.788589	0.184352	20.55084	0.0024
D(M3)	9.995450	0.448152	22.30369	0.0020
D(M3(-1))	-2.295962	0.234746	-9.780624	0.0103
D(M3(-2))	1.400354	0.175648	7.972500	0.0154
D(M3(-3))	3.406980	0.171169	19.90420	0.0025
D(PSC)	-7.900701	0.416423	-18.97279	0.0028

D(PSC(-1))	4.753223	0.319441	14.87982	0.0045
D(PSC(-2))	5.658776	0.318758	17.75256	0.0032
D(PSC(-3))	1.535545	0.191478	8.019443	0.0152
D(TR)	-0.103693	0.059580	-1.740387	0.2239
D(TR(-1))	-8.120221	0.377416	-21.51533	0.0022
D(TR(-2))	-6.913882	0.325626	-21.23261	0.0022
D(TR(-3))	-4.425606	0.223812	-19.77375	0.0025
D(IN)	0.658466	0.043991	14.96836	0.0044
D(IN(-1))	-2.256591	0.104951	-21.50139	0.0022
D(IN(-2))	-1.867925	0.086255	-21.65575	0.0021
D(IN(-3))	-0.735741	0.038069	-19.32673	0.0027
D(PX)	-1.190599	0.128317	-9.278584	0.0114
D(PX(-1))	5.295184	0.257448	20.56798	0.0024
D(PX(-2))	7.058847	0.321872	21.93058	0.0021
D(PX(-3))	4.524367	0.204892	22.08169	0.0020
CointEq(-1)*	-0.548337	0.067606	-22.90227	0.0009

R-squared	0.997534	Mean dependent var	0.491735
Adjusted R-squared	0.989890	S.D. dependent var	8.342766
S.E. of regression	0.838871	Akaike info criterion	2.575205
Sum squared resid	7.037042	Schwarz criterion	3.899144
Log likelihood	-22.07930	Hannan-Quinn criter.	3.060481
Durbin-Watson stat	1.959128		

Robust ECM Results for Nigeria

ARDL Error Correction Regression
Dependent Variable: D(GR)
Selected Model: ARDL(4, 4, 3, 3, 4, 4, 3, 3)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 11:08
Sample: 1970 2015
Included observations: 42

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	-0.764448	0.133018	-5.746950	0.0012
D(GR(-2))	-0.612278	0.131739	-4.647656	0.0035
D(GR(-3))	0.221847	0.096842	2.290816	0.0619
D(DBT)	-0.680744	0.470858	-1.445753	0.1984
D(DBT(-1))	0.313348	0.392787	0.797755	0.4554
D(DBT(-2))	-1.094988	0.510180	-2.146279	0.0755
D(DBT(-3))	1.828604	0.480006	3.809546	0.0089
D(GCF)	-0.887424	0.562632	-1.577274	0.1658
D(GCF(-1))	-0.733833	0.398309	-1.842373	0.1150
D(GCF(-2))	-2.236400	0.402512	-5.556112	0.0014
D(M3)	-0.993338	0.440037	-2.257396	0.0648
D(M3(-1))	-0.778197	0.733291	-1.061239	0.3294
D(M3(-2))	2.749932	0.586647	4.687543	0.0034
D(PSC)	0.850105	0.350048	2.428538	0.0513
D(PSC(-1))	0.552027	0.374504	1.474023	0.1909
D(PSC(-2))	-1.022178	0.388943	-2.628095	0.0392
D(PSC(-3))	1.830352	0.421361	4.343909	0.0049
D(TR)	-0.668565	0.131865	-5.070054	0.0023
D(TR(-1))	0.191401	0.103907	1.842043	0.1151
D(TR(-2))	0.098397	0.106878	0.920653	0.3927

D(TR(-3))	0.308140	0.104296	2.954471	0.0255
D(IN)	-0.199172	0.084252	-2.364002	0.0560
D(IN(-1))	-0.589315	0.103575	-5.689724	0.0013
D(IN(-2))	-0.275859	0.067268	-4.100929	0.0064
D(PX)	-0.927154	0.195459	-4.743471	0.0032
D(PX(-1))	0.232238	0.202776	1.145297	0.2957
D(PX(-2))	0.243725	0.145546	1.674554	0.1450
CointEq(-1)*	-0.162387	0.033197	4.891560	0.0027

R-squared	0.955575	Mean dependent var	-0.065240
Adjusted R-squared	0.869897	S.D. dependent var	9.719064
S.E. of regression	3.505648	Akaike info criterion	5.581349
Sum squared resid	172.0539	Schwarz criterion	6.739795
Log likelihood	-89.20832	Hannan-Quinn criter.	6.005965
Durbin-Watson stat	2.878690		

Robust ECM Results for Senegal

ARDL Error Correction Regression
Dependent Variable: D(GR)
Selected Model: ARDL(4, 4, 4, 4, 4, 2, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 11:15
Sample: 1970 2015
Included observations: 42

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	0.819690	0.156355	5.242490	0.0063
D(GR(-2))	0.031041	0.089594	0.346459	0.7465
D(GR(-3))	-0.211651	0.057189	-3.700919	0.0208
D(DBT)	0.078938	0.023384	3.375674	0.0279
D(DBT(-1))	0.107688	0.026450	4.071340	0.0152
D(DBT(-2))	0.021876	0.030664	0.713419	0.5150
D(DBT(-3))	0.178709	0.031780	5.623257	0.0049
D(GCF)	0.610791	0.097749	6.248538	0.0033
D(GCF(-1))	-1.364462	0.211932	-6.438199	0.0030
D(GCF(-2))	-0.071237	0.148908	-0.478397	0.6573
D(GCF(-3))	-0.602394	0.128470	-4.689001	0.0094
D(M3)	0.435814	0.094024	4.635154	0.0098
D(M3(-1))	1.781260	0.167983	10.60384	0.0004
D(M3(-2))	-0.102781	0.209177	-0.491358	0.6489
D(M3(-3))	1.318800	0.214673	6.143299	0.0036
D(PSC)	-1.018228	0.107154	-9.502455	0.0007
D(PSC(-1))	-1.701919	0.244415	-6.963221	0.0022
D(PSC(-2))	-0.315824	0.181354	-1.741473	0.1566
D(PSC(-3))	-0.492852	0.142021	-3.470277	0.0256
D(TR)	-0.613797	0.048244	-12.72267	0.0002
D(TR(-1))	0.580347	0.074065	7.835640	0.0014
D(IN)	0.112230	0.049393	2.272206	0.0855
D(IN(-1))	-0.769264	0.089530	-8.592229	0.0010
D(IN(-2))	-0.341536	0.070739	-4.828115	0.0085
D(IN(-3))	-0.309726	0.044591	-6.945977	0.0023
D(PX)	-0.162712	0.106556	-1.527010	0.2015
D(PX(-1))	1.924037	0.229011	8.401497	0.0011
D(PX(-2))	0.066908	0.220972	0.302787	0.7771

D(PX(-3))	1.148133	0.187472	6.124304	0.0036
CointEq(-1)*	-0.551428	0.231071	-8.877910	0.0009

R-squared	0.992823	Mean dependent var	0.287344
Adjusted R-squared	0.975480	S.D. dependent var	5.101911
S.E. of regression	0.798904	Akaike info criterion	2.564656
Sum squared resid	7.658967	Schwarz criterion	3.805849
Log likelihood	-23.85778	Hannan-Quinn criter.	3.019602
Durbin-Watson stat	2.423595		

Robust ECM Results for Togo

ARDL Error Correction Regression
Dependent Variable: D(GR)
Selected Model: ARDL(4, 4, 3, 4, 4, 4, 4, 4)
Case 2: Restricted Constant and No Trend
Date: 10/12/18 Time: 11:22
Sample: 1970 2015
Included observations: 42

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GR(-1))	-0.221826	0.064296	-3.450092	0.0409
D(GR(-2))	-0.737718	0.079440	-9.286461	0.0026
D(GR(-3))	-0.271848	0.053509	-5.080460	0.0147
D(DBT)	-0.239356	0.027510	-8.700590	0.0032
D(DBT(-1))	-0.242746	0.030069	-8.072965	0.0040
D(DBT(-2))	0.101513	0.021172	4.794814	0.0173
D(DBT(-3))	0.432739	0.032252	13.41723	0.0009
D(GCF)	-0.597157	0.086267	-6.922219	0.0062
D(GCF(-1))	1.293543	0.080256	16.11769	0.0005
D(GCF(-2))	1.170379	0.082401	14.20347	0.0008
D(M3)	0.218680	0.099434	2.199248	0.1153
D(M3(-1))	-0.293231	0.070433	-4.163244	0.0252
D(M3(-2))	-0.926730	0.105334	-8.797989	0.0031
D(M3(-3))	-0.828515	0.109632	-7.557212	0.0048
D(PSC)	1.210305	0.132239	9.152422	0.0028
D(PSC(-1))	-0.047788	0.101841	-0.469244	0.6709
D(PSC(-2))	0.311728	0.109786	2.839417	0.0657
D(PSC(-3))	1.013041	0.114028	8.884182	0.0030
D(TR)	0.209990	0.032390	6.483215	0.0074
D(TR(-1))	-0.043369	0.034872	-1.243665	0.3019
D(TR(-2))	-0.429047	0.041925	-10.23369	0.0020
D(TR(-3))	-0.355681	0.048698	-7.303830	0.0053
D(IN)	0.736815	0.045759	16.10223	0.0005
D(IN(-1))	-1.068036	0.072513	-14.72890	0.0007
D(IN(-2))	-0.882268	0.062909	-14.02457	0.0008
D(IN(-3))	-0.411517	0.045129	-9.118627	0.0028
D(PX)	0.338554	0.062235	5.439952	0.0122
D(PX(-1))	-0.065875	0.081319	-0.810085	0.4772
D(PX(-2))	0.041435	0.080417	0.515253	0.6419
D(PX(-3))	0.290123	0.051648	5.617317	0.0112
CointEq(-1)*	-0.804989	0.073513	-24.55339	0.0001

R-squared	0.995458	Mean dependent var	0.036391
Adjusted R-squared	0.983071	S.D. dependent var	8.260744

S.E. of regression	1.074822	Akaike info criterion	3.118604
Sum squared resid	12.70768	Schwarz criterion	4.401170
Log likelihood	-34.49069	Hannan-Quinn criter.	3.588715
Durbin-Watson stat	2.567696		

APPENDIX E – JOHANSEN COINTEGRATION RESULTS

Johansen Cointegration Results Benin

Date: 11/28/18 Time: 01:20
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Trend assumption: Linear deterministic trend
Series: PSC DBT IN M3 PX
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.702299	123.5922	69.81889	0.0000
At most 1 *	0.559428	73.91399	47.85613	0.0000
At most 2 *	0.396175	40.30706	29.79707	0.0022
At most 3 *	0.339557	19.62376	15.49471	0.0112
At most 4	0.061792	2.615110	3.841466	0.1058

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.702299	49.67824	33.87687	0.0003
At most 1 *	0.559428	33.60692	27.58434	0.0074
At most 2	0.396175	20.68330	21.13162	0.0577
At most 3 *	0.339557	17.00865	14.26460	0.0180
At most 4	0.061792	2.615110	3.841466	0.1058

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

PSC	DBT	IN	M3	PX
0.081452	-0.067842	0.258343	-0.110895	-0.260801
-0.240251	-0.073156	-0.336348	-0.244436	-0.143579
0.265174	-0.085584	-0.068377	-0.130571	-0.266680
-0.163191	-0.027609	0.048641	0.087741	0.585112
0.073820	0.003024	-0.046808	-0.224990	-0.119557

Unrestricted Adjustment Coefficients (alpha):

D(PSC)	0.491106	0.560000	-0.475815	0.687603	-0.182562
D(DBT)	1.284647	-3.448682	1.152496	1.875651	0.353428
D(IN)	-1.662063	0.076433	2.345209	0.546460	0.469728
D(M3)	-0.172764	-0.043547	0.875589	0.265998	-0.177135
D(PX)	1.801722	0.322138	0.224052	-0.644806	0.080189

1 Cointegrating Equation(s): Log likelihood -465.6926

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	-0.832913	3.171721	-1.361484	-3.201906
	(0.24494)	(0.72831)	(0.70047)	(1.09944)

Adjustment coefficients (standard error in parentheses)

D(PSC)	0.040002
	(0.03325)
D(DBT)	0.104637
	(0.11473)
D(IN)	-0.135378
	(0.08255)
D(M3)	-0.014072
	(0.03052)
D(PX)	0.146754
	(0.03246)

2 Cointegrating Equation(s): Log likelihood -448.8891

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	1.874299	0.380560	-0.419555
		(0.30309)	(0.23093)	(0.44273)
0.000000	1.000000	-1.557692	2.091508	3.340508
		(0.68033)	(0.51836)	(0.99377)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.094539	-0.074285
	(0.09829)	(0.03866)
D(DBT)	0.933187	0.165138
	(0.29562)	(0.11626)
D(IN)	-0.153741	0.107167
	(0.25706)	(0.10110)
D(M3)	-0.003610	0.014906
	(0.09502)	(0.03737)
D(PX)	0.069360	-0.145799
	(0.09933)	(0.03907)

3 Cointegrating Equation(s): Log likelihood -438.5475

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	0.239761	-0.069572
			(0.21593)	(0.44944)
0.000000	1.000000	0.000000	2.208523	3.049644
			(0.38318)	(0.79755)
0.000000	0.000000	1.000000	0.075121	-0.186727
			(0.14356)	(0.29882)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.220713	-0.033563	-0.028947
	(0.13643)	(0.04887)	(0.15971)
D(DBT)	1.238799	0.066503	1.413033
	(0.41649)	(0.14918)	(0.48755)
D(IN)	0.468147	-0.093545	-0.615448
	(0.31511)	(0.11287)	(0.36887)
D(M3)	0.228574	-0.060030	-0.089855
	(0.11601)	(0.04155)	(0.13580)
D(PX)	0.128773	-0.164974	0.341791

	(0.14245)	(0.05102)	(0.16675)

4 Cointegrating Equation(s): Log likelihood -430.0431

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	0.000000	-0.937865
				(0.32454)
0.000000	1.000000	0.000000	0.000000	-4.948499
				(1.83458)
0.000000	0.000000	1.000000	0.000000	-0.458776
				(0.26829)
0.000000	0.000000	0.000000	1.000000	3.621489
				(0.82097)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.332924	-0.052547	0.004499	-0.068887
	(0.13520)	(0.04522)	(0.14554)	(0.10474)
D(DBT)	0.932708	0.014718	1.504266	0.714608
	(0.42178)	(0.14106)	(0.45403)	(0.32673)
D(IN)	0.378970	-0.108632	-0.588868	-0.092638
	(0.34116)	(0.11410)	(0.36725)	(0.26428)
D(M3)	0.185165	-0.067374	-0.076917	-0.061185
	(0.12458)	(0.04166)	(0.13410)	(0.09650)
D(PX)	0.234000	-0.147172	0.310427	-0.364375
	(0.14413)	(0.04820)	(0.15515)	(0.11165)

Johansen Cointegration Results Burkina Faso

Date: 11/28/18 Time: 03:19
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Trend assumption: Linear deterministic trend
Series: PSC DBT IN M3 PX
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.801031	129.1975	69.81889	0.0000
At most 1 *	0.538848	62.99859	47.85613	0.0010
At most 2 *	0.317580	31.26347	29.79707	0.0337
At most 3 *	0.300140	15.59697	15.49471	0.0483
At most 4	0.023264	0.965082	3.841466	0.3259

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.801031	66.19887	33.87687	0.0000
At most 1 *	0.538848	31.73512	27.58434	0.0138

At most 2	0.317580	15.66650	21.13162	0.2449
At most 3 *	0.300140	14.63189	14.26460	0.0437
At most 4	0.023264	0.965082	3.841466	0.3259

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

PSC	DBT	IN	M3	PX
0.178058	0.096088	-0.086129	-0.008463	0.479974
0.740861	0.037108	-0.215218	-0.399087	-0.372015
-0.344875	-0.050053	-0.536472	0.295295	0.503651
-0.467756	-0.148504	-0.294480	0.527710	0.733541
-0.143743	-0.016244	0.000153	-0.220642	-0.126754

Unrestricted Adjustment Coefficients (alpha):

D(PSC)	-0.682715	-0.587799	0.015418	0.303920	0.005591
D(DBT)	-0.398762	1.202354	-0.076788	0.733651	0.464024
D(IN)	-1.108714	0.624300	1.777024	-0.201682	0.133823
D(M3)	-0.901015	0.676056	-0.047450	0.501590	-0.068575
D(PX)	-1.245269	-0.271069	-0.492030	-0.300758	0.032197

1 Cointegrating Equation(s): Log likelihood -407.7416

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.539643	-0.483711	-0.047531	2.695604
	(0.08225)	(0.40863)	(0.26633)	(0.52616)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.121563
	(0.04219)
D(DBT)	-0.071003
	(0.15169)
D(IN)	-0.197415
	(0.14078)
D(M3)	-0.160433
	(0.05916)
D(PX)	-0.221730
	(0.05215)

2 Cointegrating Equation(s): Log likelihood -391.8741

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	-0.270730	-0.588931	-0.829305
		(0.18739)	(0.12607)	(0.26425)
0.000000	1.000000	-0.394670	1.003255	6.531923
		(0.83444)	(0.56142)	(1.17671)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.557040	-0.087412
	(0.14846)	(0.02007)
D(DBT)	0.819774	0.006300
	(0.61416)	(0.08302)
D(IN)	0.265104	-0.083368

	(0.59247)	(0.08009)
D(M3)	0.340431	-0.061490
	(0.22388)	(0.03026)
D(PX)	-0.422554	-0.129714
	(0.21807)	(0.02948)

3 Cointegrating Equation(s): Log likelihood -384.0408

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	-0.648280	-1.056271
			(0.11600)	(0.18966)
0.000000	1.000000	0.000000	0.916735	6.201052
			(0.51460)	(0.84136)
0.000000	0.000000	1.000000	-0.219220	-0.838350
			(0.19057)	(0.31158)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.562357	-0.088184	0.177035
	(0.16293)	(0.02231)	(0.11385)
D(DBT)	0.846256	0.010144	-0.183229
	(0.67398)	(0.09229)	(0.47094)
D(IN)	-0.347746	-0.172313	-0.992193
	(0.55378)	(0.07583)	(0.38695)
D(M3)	0.356795	-0.059115	-0.042441
	(0.24557)	(0.03363)	(0.17160)
D(PX)	-0.252866	-0.105086	0.429553
	(0.21997)	(0.03012)	(0.15370)

4 Cointegrating Equation(s): Log likelihood -376.7249

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	0.000000	0.943971
				(0.39207)
0.000000	1.000000	0.000000	0.000000	3.372503
				(0.58970)
0.000000	0.000000	1.000000	0.000000	-0.161957
				(0.27360)
0.000000	0.000000	0.000000	1.000000	3.085459
				(0.54755)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.704517	-0.133318	0.087537	0.405295
	(0.17432)	(0.03411)	(0.11904)	(0.13181)
D(DBT)	0.503086	-0.098807	-0.399275	-0.111990
	(0.75519)	(0.14779)	(0.51572)	(0.57102)
D(IN)	-0.253408	-0.142362	-0.932802	0.178550
	(0.63295)	(0.12387)	(0.43224)	(0.47859)
D(M3)	0.122173	-0.133603	-0.190149	-0.011498
	(0.25886)	(0.05066)	(0.17678)	(0.19573)
D(PX)	-0.112184	-0.060423	0.518120	-0.185288
	(0.24320)	(0.04759)	(0.16608)	(0.18389)

Johansen Cointegration Results Cote D'Ivoire

Date: 11/28/18 Time: 02:49

Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Trend assumption: Linear deterministic trend
Series: PSC DBT IN M3 PX
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.734526	113.6194	69.81889	0.0000
At most 1 *	0.649096	59.24371	47.85613	0.0030
At most 2	0.210000	16.30672	29.79707	0.6905
At most 3	0.140988	6.642110	15.49471	0.6196
At most 4	0.009980	0.411230	3.841466	0.5213

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.734526	54.37573	33.87687	0.0001
At most 1 *	0.649096	42.93699	27.58434	0.0003
At most 2	0.210000	9.664605	21.13162	0.7755
At most 3	0.140988	6.230880	14.26460	0.5838
At most 4	0.009980	0.411230	3.841466	0.5213

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

PSC	DBT	IN	M3	PX
0.740322	-0.134349	-0.491497	-0.619048	-0.151327
-0.166686	0.016181	0.372596	0.217616	-0.778111
-0.139793	-0.016263	-0.080478	0.031766	0.089072
-0.074465	-0.003642	0.071936	-0.006863	0.457345
0.071962	-0.021082	-0.254547	0.391371	0.354977

Unrestricted Adjustment Coefficients (alpha):

D(PSC)	0.548980	1.089541	0.290774	0.145388	0.096265
D(DBT)	3.692560	-3.843282	-1.849109	-0.317368	0.098023
D(IN)	-0.708278	-4.073189	0.670846	-1.316562	-0.504963
D(M3)	0.430239	-0.836900	0.703461	0.056662	0.093067
D(PX)	-0.332096	0.188602	0.060198	-0.804179	-0.002885

1 Cointegrating Equation(s): Log likelihood -481.4637

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	-0.181473	-0.663897	-0.836188	-0.204407
	(0.00866)	(0.06965)	(0.08735)	(0.18362)

Adjustment coefficients (standard error in parentheses)

D(PSC)	0.406422
	(0.31404)
D(DBT)	2.733682
	(1.14744)
D(IN)	-0.524353
	(1.37696)
D(M3)	0.318515
	(0.35598)
D(PX)	-0.245858
	(0.36820)

2 Cointegrating Equation(s): Log likelihood -459.9952

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	-4.042746	-1.845395	10.27247
		(0.77800)	(1.02486)	(2.14902)
0.000000	1.000000	-18.61899	-5.561186	57.73234
		(4.33821)	(5.71469)	(11.9831)

Adjustment coefficients (standard error in parentheses)

D(PSC)	0.224810	-0.056125
	(0.26008)	(0.04638)
D(DBT)	3.374305	-0.558279
	(0.96731)	(0.17249)
D(IN)	0.154592	0.029248
	(1.22036)	(0.21762)
D(M3)	0.458015	-0.071344
	(0.33454)	(0.05966)
D(PX)	-0.277296	0.047668
	(0.37598)	(0.06705)

3 Cointegrating Equation(s): Log likelihood -455.1629

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	-0.495651	-0.230497
			(0.83783)	(1.15868)
0.000000	1.000000	0.000000	0.655102	9.360608
			(3.99486)	(5.52473)
0.000000	0.000000	1.000000	0.333868	-2.597978
			(0.31266)	(0.43240)

Adjustment coefficients (standard error in parentheses)

D(PSC)	0.184162	-0.060854	0.112735
	(0.25940)	(0.04582)	(0.20910)
D(DBT)	3.632798	-0.528207	-3.098062
	(0.92752)	(0.16383)	(0.74766)
D(IN)	0.060812	0.018338	-1.223525
	(1.23520)	(0.21818)	(0.99568)
D(M3)	0.359676	-0.082784	-0.579900
	(0.31656)	(0.05591)	(0.25517)
D(PX)	-0.285711	0.046689	0.228652
	(0.38216)	(0.06750)	(0.30805)

4 Cointegrating Equation(s): Log likelihood -452.0475

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	0.000000	-5.241063
				(2.60484)
0.000000	1.000000	0.000000	0.000000	15.98307
				(7.09948)
0.000000	0.000000	1.000000	0.000000	0.777116
				(1.86167)
0.000000	0.000000	0.000000	1.000000	-10.10906
				(5.31423)

Adjustment coefficients (standard error in parentheses)

D(PSC)	0.173336	-0.061383	0.123194	-0.094504
	(0.25932)	(0.04561)	(0.20945)	(0.21977)
D(DBT)	3.656431	-0.527051	-3.120892	-3.178794
	(0.93012)	(0.16359)	(0.75126)	(0.78828)
D(IN)	0.158850	0.023133	-1.318233	-0.417589
	(1.21865)	(0.21433)	(0.98431)	(1.03281)
D(M3)	0.355456	-0.082991	-0.575824	-0.426504
	(0.31787)	(0.05591)	(0.25674)	(0.26939)
D(PX)	-0.225828	0.049618	0.170803	0.254058
	(0.35630)	(0.06267)	(0.28779)	(0.30197)

Johansen Cointegration Results Ghana

Date: 11/28/18 Time: 01:50
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Trend assumption: Linear deterministic trend
Series: PSC DBT IN M3 PX
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.681004	125.2270	69.81889	0.0000
At most 1 *	0.598858	78.38145	47.85613	0.0000
At most 2 *	0.450234	40.93041	29.79707	0.0018
At most 3 *	0.262944	16.40163	15.49471	0.0364
At most 4 *	0.090580	3.892859	3.841466	0.0485

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.681004	46.84558	33.87687	0.0009
At most 1 *	0.598858	37.45104	27.58434	0.0020
At most 2 *	0.450234	24.52878	21.13162	0.0160
At most 3	0.262944	12.50877	14.26460	0.0930
At most 4 *	0.090580	3.892859	3.841466	0.0485

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

PSC	DBT	IN	M3	PX
-0.558026	-0.052343	-0.152158	0.362218	0.141067
0.322162	0.022606	-0.053340	-0.150852	0.093405
0.299252	-0.050181	0.179011	-0.170333	0.366317
0.308940	-0.017041	-0.038070	-0.324217	-0.111054
0.831212	0.040257	0.090403	-0.154041	-0.363898

Unrestricted Adjustment Coefficients (alpha):

D(PSC)	-0.140358	0.269986	0.111837	0.213849	-0.256090
D(DBT)	2.361123	0.307601	0.148000	3.337514	-1.248736
D(IN)	8.213955	-1.735807	-6.847227	-5.055495	1.101712
D(M3)	-0.098260	0.838829	-0.609239	0.287847	0.150601
D(PX)	-1.198369	-0.571242	-0.874913	0.542548	-0.259277

1 Cointegrating Equation(s): Log likelihood -502.6107

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.093800	0.272671	-0.649106	-0.252796
	(0.02137)	(0.05715)	(0.08642)	(0.14031)

Adjustment coefficients (standard error in parentheses)

D(PSC)	0.078323
	(0.13160)
D(DBT)	-1.317567
	(1.01124)
D(IN)	-4.583597
	(2.02970)
D(M3)	0.054832
	(0.20521)
D(PX)	0.668721
	(0.27987)

2 Cointegrating Equation(s): Log likelihood -483.8852

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	-1.466908	0.068794	1.901542
		(0.47214)	(0.73100)	(0.89793)
0.000000	1.000000	18.54560	-7.653506	-22.96733
		(5.25698)	(8.13925)	(9.99802)

Adjustment coefficients (standard error in parentheses)

D(PSC)	0.165302	0.013450
	(0.14662)	(0.01297)
D(DBT)	-1.218470	-0.116634
	(1.16678)	(0.10324)
D(IN)	-5.142808	-0.469181
	(2.32958)	(0.20614)
D(M3)	0.325070	0.024106
	(0.20191)	(0.01787)
D(PX)	0.484688	0.049813
	(0.31194)	(0.02760)

3 Cointegrating Equation(s): Log likelihood -471.6208

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	-0.475847	0.617804
			(0.16114)	(0.18231)
0.000000	1.000000	0.000000	-0.767800	-6.737477
			(1.13931)	(1.28904)
0.000000	0.000000	1.000000	-0.371285	-0.875132
			(0.40722)	(0.46074)

Adjustment coefficients (standard error in parentheses)

D(PSC)	0.198770	0.007838	0.026975
	(0.16063)	(0.01717)	(0.05447)
D(DBT)	-1.174181	-0.124061	-0.349177
	(1.28625)	(0.13751)	(0.43618)
D(IN)	-7.191855	-0.125577	-2.382956
	(2.31345)	(0.24733)	(0.78451)
D(M3)	0.142754	0.054678	-0.138853
	(0.19926)	(0.02130)	(0.06757)
D(PX)	0.222869	0.093717	0.056192
	(0.31299)	(0.03346)	(0.10614)

4 Cointegrating Equation(s): Log likelihood -465.3664

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	0.000000	1.665384
				(0.47687)
0.000000	1.000000	0.000000	0.000000	-5.047161
				(1.11830)
0.000000	0.000000	1.000000	0.000000	-0.057746
				(0.40562)
0.000000	0.000000	0.000000	1.000000	2.201505
				(0.74549)

Adjustment coefficients (standard error in parentheses)

D(PSC)	0.264836	0.004194	0.018834	-0.179951
	(0.17099)	(0.01718)	(0.05383)	(0.11846)
D(DBT)	-0.143089	-0.180936	-0.476238	-0.298449
	(1.27100)	(0.12771)	(0.40016)	(0.88058)
D(IN)	-8.753699	-0.039427	-2.190491	6.042474
	(2.35728)	(0.23686)	(0.74216)	(1.63318)
D(M3)	0.231682	0.049773	-0.149811	-0.151682
	(0.21117)	(0.02122)	(0.06649)	(0.14631)
D(PX)	0.390483	0.084471	0.035537	-0.374774
	(0.32739)	(0.03290)	(0.10308)	(0.22683)

Johansen Cointegration Results Mali

Date: 11/28/18 Time: 01:51
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Trend assumption: Linear deterministic trend
Series: PSC DBT IN M3 PX
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.522617	83.64127	69.81889	0.0027
At most 1 *	0.423528	53.32435	47.85613	0.0140
At most 2 *	0.318365	30.74035	29.79707	0.0388
At most 3	0.234287	15.02664	15.49471	0.0587
At most 4 *	0.094761	4.081791	3.841466	0.0433

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.522617	30.31692	33.87687	0.1255
At most 1	0.423528	22.58400	27.58434	0.1919
At most 2	0.318365	15.71371	21.13162	0.2420
At most 3	0.234287	10.94485	14.26460	0.1570
At most 4 *	0.094761	4.081791	3.841466	0.0433

Max-eigenvalue test indicates 1 cointegration eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

PSC	DBT	IN	M3	PX
0.009653	-0.055917	0.307186	-0.551218	-0.613992
-0.348196	-0.037579	0.099556	0.346336	0.744615
-0.339555	-0.061680	0.168609	-0.500027	-0.247030
-0.194467	0.026440	-0.027587	0.445879	0.252553
0.026922	0.007186	-0.380910	0.449444	0.351420

Unrestricted Adjustment Coefficients (alpha):

D(PSC)	0.698785	0.165414	0.679926	0.601666	-0.019094
D(DBT)	1.609975	-0.733790	-0.434834	-2.943464	0.910609
D(IN)	-2.532305	-0.218787	0.398928	-1.239766	1.469666
D(M3)	-0.395287	-0.607157	0.813215	0.052141	-0.233745
D(PX)	0.703943	-0.869233	-0.563066	-0.028197	0.341739

1 Cointegrating Equation(s): Log likelihood -499.1959

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	-5.792533	31.82189	-57.10147	-63.60437
	(1.77892)	(11.2783)	(23.5083)	(22.7398)

Adjustment coefficients (standard error in parentheses)

D(PSC)	0.006746
	(0.00415)
D(DBT)	0.015542
	(0.01565)

D(IN)	-0.024445				
	(0.01326)				
D(M3)	-0.003816				
	(0.00425)				
D(PX)	0.006795				
	(0.00468)				

2 Cointegrating Equation(s): Log likelihood -487.9039

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.301366	-2.020910	-3.262769
		(0.32716)	(0.50413)	(0.62832)
0.000000	1.000000	-5.441579	9.508889	10.41713
		(1.46283)	(2.25413)	(2.80938)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.050851	-0.045290
	(0.14917)	(0.02885)
D(DBT)	0.271044	-0.062450
	(0.56181)	(0.10866)
D(IN)	0.051736	0.149821
	(0.47798)	(0.09245)
D(M3)	0.207594	0.044920
	(0.14539)	(0.02812)
D(PX)	0.309458	-0.006697
	(0.15398)	(0.02978)

3 Cointegrating Equation(s): Log likelihood -480.0470

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	-4.814406	-6.581042
			(1.14842)	(1.53705)
0.000000	1.000000	0.000000	59.94941	70.33323
			(16.4041)	(21.9554)
0.000000	0.000000	1.000000	9.269463	11.01079
			(3.07567)	(4.11649)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.281723	-0.087228	0.345767
	(0.19400)	(0.03643)	(0.14528)
D(DBT)	0.418694	-0.035629	0.348193
	(0.78307)	(0.14704)	(0.58642)
D(IN)	-0.083722	0.125215	-0.732408
	(0.66602)	(0.12506)	(0.49876)
D(M3)	-0.068538	-0.005240	-0.044757
	(0.18162)	(0.03410)	(0.13601)
D(PX)	0.500650	0.028033	0.034767
	(0.20565)	(0.03862)	(0.15400)

4 Cointegrating Equation(s): Log likelihood -474.5746

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	0.000000	0.253052
				(0.46998)
0.000000	1.000000	0.000000	0.000000	-14.76551
				(5.02361)

0.000000	0.000000	1.000000	0.000000	-2.147297
				(0.81489)
0.000000	0.000000	0.000000	1.000000	1.419509
				(0.23980)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.398728	-0.071320	0.329169	-0.399605
	(0.19602)	(0.03558)	(0.13669)	(0.34953)
D(DBT)	0.991101	-0.113455	0.429394	-2.236585
	(0.76554)	(0.13896)	(0.53385)	(1.36506)
D(IN)	0.157371	0.092435	-0.698207	0.567818
	(0.70162)	(0.12736)	(0.48928)	(1.25109)
D(M3)	-0.078677	-0.003861	-0.046195	-0.375772
	(0.19550)	(0.03549)	(0.13633)	(0.34859)
D(PX)	0.506133	0.027287	0.035544	-0.420097
	(0.22145)	(0.04020)	(0.15443)	(0.39487)

Johansen Cointegration Results Niger

Date: 11/28/18 Time: 02:51
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Trend assumption: Linear deterministic trend
Series: PSC DBT IN M3 PX
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.736212	124.5516	69.81889	0.0000
At most 1 *	0.574535	69.91467	47.85613	0.0001
At most 2 *	0.401281	34.87717	29.79707	0.0119
At most 3	0.267315	13.84573	15.49471	0.0873
At most 4	0.026309	1.093115	3.841466	0.2958

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.736212	54.63696	33.87687	0.0001
At most 1 *	0.574535	35.03749	27.58434	0.0046
At most 2	0.401281	21.03145	21.13162	0.0516
At most 3	0.267315	12.75261	14.26460	0.0855
At most 4	0.026309	1.093115	3.841466	0.2958

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

PSC	DBT	IN	M3	PX
0.422735	-0.028537	-0.375366	-0.726311	0.416058
0.114212	-0.043043	-0.450759	-0.010679	-0.130952
-0.092972	0.068518	0.017550	-0.030169	0.062247
0.409832	0.058507	0.140072	-0.090875	0.131525
-0.056455	-0.006492	-0.123090	0.191248	0.150095

Unrestricted Adjustment Coefficients (alpha):

D(PSC)	0.533415	-0.193033	-0.396985	-0.354748	0.027667
D(DBT)	-2.185445	2.164598	-4.235705	0.657721	0.623007
D(IN)	-2.295374	2.597330	1.698282	-1.857018	-0.119636
D(M3)	1.243948	0.048579	-0.006920	0.043696	0.077081
D(PX)	-1.466713	-0.275655	0.764809	0.127513	0.185428

1 Cointegrating Equation(s): Log likelihood -461.6750

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	-0.067505	-0.887947	-1.718124	0.984206
	(0.03380)	(0.18395)	(0.15817)	(0.11516)

Adjustment coefficients (standard error in parentheses)

D(PSC)	0.225493
	(0.09982)
D(DBT)	-0.923864
	(0.81688)
D(IN)	-0.970335
	(0.56767)
D(M3)	0.525860
	(0.08629)
D(PX)	-0.620031
	(0.18726)

2 Cointegrating Equation(s): Log likelihood -444.1563

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	-0.220518	-2.072623	1.449150
		(0.22379)	(0.25654)	(0.19254)
0.000000	1.000000	9.887138	-5.251464	6.887572
		(2.32734)	(2.66791)	(2.00234)

Adjustment coefficients (standard error in parentheses)

D(PSC)	0.203446	-0.006913
	(0.10157)	(0.01198)
D(DBT)	-0.676641	-0.030806
	(0.81775)	(0.09644)
D(IN)	-0.673688	-0.046295
	(0.52696)	(0.06215)
D(M3)	0.531408	-0.037589
	(0.08925)	(0.01053)
D(PX)	-0.651514	0.053720
	(0.19199)	(0.02264)

3 Cointegrating Equation(s): Log likelihood -433.6406

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	-2.117010	1.538259
			(0.29171)	(0.22083)
0.000000	1.000000	0.000000	-3.261352	2.892262
			(1.87796)	(1.42167)
0.000000	0.000000	1.000000	-0.201283	0.404092
			(0.29852)	(0.22599)

Adjustment coefficients (standard error in parentheses)

D(PSC)	0.240355	-0.034114	-0.120181
	(0.09549)	(0.01830)	(0.12518)
D(DBT)	-0.282838	-0.321026	-0.229708
	(0.71389)	(0.13683)	(0.93588)
D(IN)	-0.831581	0.070067	-0.279360
	(0.50969)	(0.09769)	(0.66818)
D(M3)	0.532052	-0.038063	-0.488955
	(0.09124)	(0.01749)	(0.11961)
D(PX)	-0.722620	0.106123	0.688231
	(0.17987)	(0.03448)	(0.23580)

4 Cointegrating Equation(s): Log likelihood -427.2643

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	0.000000	-0.002535
				(0.25452)
0.000000	1.000000	0.000000	0.000000	0.518596
				(1.07085)
0.000000	0.000000	1.000000	0.000000	0.257595
				(0.17688)
0.000000	0.000000	0.000000	1.000000	-0.727816
				(0.15315)

Adjustment coefficients (standard error in parentheses)

D(PSC)	0.094968	-0.054869	-0.169872	-0.341149
	(0.11967)	(0.02048)	(0.11896)	(0.14447)
D(DBT)	-0.013283	-0.282544	-0.137579	1.632215
	(0.96355)	(0.16487)	(0.95785)	(1.16319)
D(IN)	-1.592647	-0.038582	-0.539477	1.756938
	(0.64084)	(0.10965)	(0.63705)	(0.77362)
D(M3)	0.549960	-0.035507	-0.482834	-0.907774
	(0.12355)	(0.02114)	(0.12282)	(0.14915)
D(PX)	-0.670361	0.113583	0.706092	1.033573
	(0.24322)	(0.04162)	(0.24178)	(0.29361)

Johansen Cointegration Results Nigeria

Date: 11/28/18 Time: 02:17
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Trend assumption: Linear deterministic trend
Series: PSC DBT IN PX M3
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized	Trace	0.05

No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.849684	145.2557	69.81889	0.0000
At most 1 *	0.647867	67.56009	47.85613	0.0003
At most 2	0.286006	24.76650	29.79707	0.1699
At most 3	0.213362	10.95437	15.49471	0.2143
At most 4	0.026827	1.114915	3.841466	0.2910

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.849684	77.69558	33.87687	0.0000
At most 1 *	0.647867	42.79359	27.58434	0.0003
At most 2	0.286006	13.81213	21.13162	0.3807
At most 3	0.213362	9.839459	14.26460	0.2227
At most 4	0.026827	1.114915	3.841466	0.2910

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

PSC	DBT	IN	PX	M3
0.088672	0.407956	-0.093442	0.131920	0.064930
0.535678	0.277742	0.088591	0.281794	-0.427807
0.154872	0.094070	0.047395	-0.137314	-0.140428
-0.143523	-0.349728	0.125779	-0.027423	0.379827
-0.228049	0.071755	0.064036	0.027692	0.153321

Unrestricted Adjustment Coefficients (alpha):

D(PSC)	-2.221574	-0.907114	-0.280820	-0.648764	0.176779
D(DBT)	-0.133015	-0.963825	-0.780915	0.489168	-0.035955
D(IN)	15.10948	-0.623056	3.807306	-0.188163	-0.192110
D(PX)	-4.688729	-0.883058	1.716808	0.751762	-0.121521
D(M3)	-2.329047	-0.620862	-0.918320	-0.575631	-0.069982

1 Cointegrating Equation(s): Log likelihood -510.1751

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	PX	M3
1.000000	4.600705	-1.053792	1.487722	0.732246
	(0.53394)	(0.21284)	(0.28339)	(0.32396)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.196992
	(0.04795)
D(DBT)	-0.011795
	(0.04428)
D(IN)	1.339794
	(0.19640)
D(PX)	-0.415761
	(0.08773)

D(M3)	-0.206522				
	(0.05081)				

2 Cointegrating Equation(s): Log likelihood -488.7783

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	PX	M3
1.000000	0.000000	0.320230	0.403908	-0.993065
		(0.06024)	(0.09217)	(0.11156)
0.000000	1.000000	-0.298655	0.235576	0.375010
		(0.04380)	(0.06702)	(0.08112)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.682914	-1.158247
	(0.27102)	(0.24634)
D(DBT)	-0.528095	-0.321959
	(0.24314)	(0.22100)
D(IN)	1.006037	5.990950
	(1.20012)	(1.09084)
D(PX)	-0.888796	-2.158056
	(0.52580)	(0.47793)
D(M3)	-0.539105	-1.122588
	(0.30137)	(0.27393)

3 Cointegrating Equation(s): Log likelihood -481.8722

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	PX	M3
1.000000	0.000000	0.000000	3.149674	-0.722145
			(1.06103)	(1.29110)
0.000000	1.000000	0.000000	-2.325196	0.122344
			(0.98023)	(1.19278)
0.000000	0.000000	1.000000	-8.574360	-0.846016
			(3.26934)	(3.97822)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.726405	-1.184664	0.113917
	(0.27947)	(0.24868)	(0.06791)
D(DBT)	-0.649037	-0.395419	-0.109969
	(0.23172)	(0.20619)	(0.05631)
D(IN)	1.595682	6.349103	-1.286616
	(1.14641)	(1.02009)	(0.27859)
D(PX)	-0.622911	-1.996556	0.441262
	(0.49951)	(0.44447)	(0.12138)
D(M3)	-0.681327	-1.208974	0.119105
	(0.28993)	(0.25799)	(0.07046)

4 Cointegrating Equation(s): Log likelihood -476.9525

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	PX	M3
1.000000	0.000000	0.000000	0.000000	-2.664131
				(0.56021)
0.000000	1.000000	0.000000	0.000000	1.555984
				(0.50023)
0.000000	0.000000	1.000000	0.000000	4.440654
				(1.60769)
0.000000	0.000000	0.000000	1.000000	0.616567
				(0.40915)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.633293	-0.957773	0.032316	-0.492338
	(0.27501)	(0.28897)	(0.08787)	(0.16107)
D(DBT)	-0.719244	-0.566495	-0.048441	-0.195332
	(0.22998)	(0.24165)	(0.07348)	(0.13469)
D(IN)	1.622687	6.414908	-1.310283	1.300033
	(1.18260)	(1.24262)	(0.37784)	(0.69261)
D(PX)	-0.730805	-2.259468	0.535818	-1.123734
	(0.50550)	(0.53116)	(0.16151)	(0.29606)
D(M3)	-0.598711	-1.007660	0.046703	-0.340320
	(0.28909)	(0.30377)	(0.09237)	(0.16931)

Johansen Cointegration Results Senegal

Date: 11/28/18 Time: 01:53
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Trend assumption: Linear deterministic trend
Series: PSC DBT IN M3 PX
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.733636	110.5883	69.81889	0.0000
At most 1 *	0.540855	56.34968	47.85613	0.0065
At most 2	0.268036	24.43572	29.79707	0.1826
At most 3	0.226445	11.64272	15.49471	0.1749
At most 4	0.026844	1.115640	3.841466	0.2909

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.733636	54.23861	33.87687	0.0001
At most 1 *	0.540855	31.91396	27.58434	0.0130
At most 2	0.268036	12.79300	21.13162	0.4715
At most 3	0.226445	10.52708	14.26460	0.1796
At most 4	0.026844	1.115640	3.841466	0.2909

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

PSC	DBT	IN	M3	PX
0.001378	0.172386	0.410000	0.096946	0.055721
-0.133197	-0.032895	0.387315	0.445171	-0.326917
0.112932	0.029381	0.315339	-0.062167	0.216707

-0.164004	-0.000779	-0.171273	-0.137384	0.312278	
-0.087399	-0.041350	-0.166968	-0.552990	0.395577	

Unrestricted Adjustment Coefficients (alpha):

D(PSC)	0.135098	0.803755	0.040874	0.128994	0.253384
D(DBT)	-4.562625	0.444599	0.019669	-1.484797	-0.252477
D(IN)	-1.732702	-2.058023	-1.950880	-0.323230	-0.211146
D(M3)	-0.086992	0.573579	-0.245446	0.484035	-0.064085
D(PX)	0.520335	0.382666	-0.581349	-0.520183	0.117977

1 Cointegrating Equation(s): Log likelihood -451.7469

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	125.1086	297.5565	70.35812	40.43919
	(17.7422)	(68.2891)	(73.4340)	(63.9347)

Adjustment coefficients (standard error in parentheses)

D(PSC)	0.000186
	(0.00061)
D(DBT)	-0.006287
	(0.00141)
D(IN)	-0.002387
	(0.00159)
D(M3)	-0.000120
	(0.00045)
D(PX)	0.000717
	(0.00058)

2 Cointegrating Equation(s): Log likelihood -435.7900

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	-3.502119	-3.487963	2.379255
		(0.89159)	(1.15526)	(1.01405)
0.000000	1.000000	2.406379	0.590256	0.304215
		(0.44712)	(0.57934)	(0.50853)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.106872	-0.003150
	(0.05316)	(0.07004)
D(DBT)	-0.065506	-0.801156
	(0.13611)	(0.17932)
D(IN)	0.271735	-0.230995
	(0.14006)	(0.18453)
D(M3)	-0.076519	-0.033864
	(0.03978)	(0.05241)
D(PX)	-0.050253	0.077111
	(0.05464)	(0.07199)

3 Cointegrating Equation(s): Log likelihood -429.3935

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	-1.767950	2.045935
			(1.20253)	(1.18785)
0.000000	1.000000	0.000000	-0.591600	0.533247

			(0.97826)	(0.96632)
0.000000	0.000000	1.000000	0.491135	-0.095177
			(0.36276)	(0.35833)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.102256	-0.001949	0.379586
	(0.06968)	(0.07100)	(0.25783)
D(DBT)	-0.063285	-0.800578	-1.692272
	(0.17844)	(0.18182)	(0.66027)
D(IN)	0.051418	-0.288315	-2.122699
	(0.16616)	(0.16931)	(0.61483)
D(M3)	-0.104238	-0.041075	0.109091
	(0.05122)	(0.05218)	(0.18951)
D(PX)	-0.115906	0.060030	0.178228
	(0.06774)	(0.06902)	(0.25066)

4 Cointegrating Equation(s): Log likelihood -424.1299

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	0.000000	-1.204867
				(0.49412)
0.000000	1.000000	0.000000	0.000000	-0.554553
				(0.56294)
0.000000	0.000000	1.000000	0.000000	0.807892
				(0.30768)
0.000000	0.000000	0.000000	1.000000	-1.838740
				(0.39872)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.123411	-0.002050	0.357493	0.350642
	(0.09533)	(0.07080)	(0.26600)	(0.19096)
D(DBT)	0.180228	-0.799421	-1.437967	-0.041640
	(0.23079)	(0.17142)	(0.64400)	(0.46232)
D(IN)	0.104429	-0.288063	-2.067339	-0.918462
	(0.22726)	(0.16879)	(0.63413)	(0.45524)
D(M3)	-0.183621	-0.041452	0.026189	0.195667
	(0.06503)	(0.04830)	(0.18146)	(0.13027)
D(PX)	-0.030594	0.060435	0.267321	0.328401
	(0.08842)	(0.06568)	(0.24674)	(0.17713)

Johansen Cointegration Results Togo

Date: 11/28/18 Time: 01:54
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Trend assumption: Linear deterministic trend
Series: PSC DBT IN M3 PX
Lags interval (in first differences): 1 to 4

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.857791	163.2720	69.81889	0.0000
At most 1 *	0.590920	83.30326	47.85613	0.0000

At most 2 *	0.432874	46.65562	29.79707	0.0003
At most 3 *	0.318964	23.40153	15.49471	0.0026
At most 4 *	0.170248	7.651787	3.841466	0.0057

Trace test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.857791	79.96876	33.87687	0.0000
At most 1 *	0.590920	36.64764	27.58434	0.0026
At most 2 *	0.432874	23.25409	21.13162	0.0248
At most 3 *	0.318964	15.74975	14.26460	0.0289
At most 4 *	0.170248	7.651787	3.841466	0.0057

Max-eigenvalue test indicates 5 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

PSC	DBT	IN	M3	PX
0.203612	0.044773	-0.028613	-0.173482	0.072232
0.695493	0.006785	-0.291876	-0.374508	-0.166301
-0.089792	-0.009572	0.149001	0.223530	0.080717
-0.181972	0.024018	0.516139	0.036221	0.124460
-0.086720	0.059225	-0.086545	0.025755	-0.233747

Unrestricted Adjustment Coefficients (alpha):

D(PSC)	-1.678218	-0.191511	0.145041	-0.453129	-0.618120
D(DBT)	-1.416631	7.616429	-4.797601	-0.839758	-0.005804
D(IN)	3.767172	-1.561038	-0.946150	-1.665237	0.903342
D(M3)	-0.216248	-0.535850	-1.184957	0.324134	-0.773391
D(PX)	-4.635050	-0.331023	-0.659588	0.791755	0.338063

1 Cointegrating Equation(s): Log likelihood -553.2042

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.219896	-0.140527	-0.852020	0.354755
	(0.03606)	(0.21328)	(0.09012)	(0.13625)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.341706
	(0.08696)
D(DBT)	-0.288443
	(0.57946)
D(IN)	0.767042
	(0.21926)
D(M3)	-0.044031
	(0.12861)
D(PX)	-0.943753
	(0.12697)

2 Cointegrating Equation(s): Log likelihood -534.8804

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	-0.432626	-0.523924	-0.266681
		(0.13243)	(0.05021)	(0.07963)
0.000000	1.000000	1.328354	-1.492056	2.826052
		(1.16984)	(0.44350)	(0.70345)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.474900	-0.076439
	(0.30785)	(0.01924)
D(DBT)	5.008730	-0.011752
	(1.62789)	(0.10172)
D(IN)	-0.318649	0.158078
	(0.73594)	(0.04599)
D(M3)	-0.416710	-0.013318
	(0.44898)	(0.02806)
D(PX)	-1.173977	-0.209773
	(0.44855)	(0.02803)

3 Cointegrating Equation(s): Log likelihood -523.2533

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	0.047198	0.028455
			(0.17131)	(0.19026)
0.000000	1.000000	0.000000	-3.245651	1.919855
			(0.65302)	(0.72525)
0.000000	0.000000	1.000000	1.320127	0.682196
			(0.37347)	(0.41478)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.487923	-0.077827	0.125528
	(0.30926)	(0.01960)	(0.13931)
D(DBT)	5.439517	0.034170	-2.897369
	(1.42995)	(0.09064)	(0.64417)
D(IN)	-0.233692	0.167134	0.206862
	(0.72443)	(0.04592)	(0.32634)
D(M3)	-0.310310	-0.001975	-0.013971
	(0.40653)	(0.02577)	(0.18314)
D(PX)	-1.114751	-0.203459	0.130961
	(0.43827)	(0.02778)	(0.19743)

4 Cointegrating Equation(s): Log likelihood -515.3784

Normalized cointegrating coefficients (standard error in parentheses)

PSC	DBT	IN	M3	PX
1.000000	0.000000	0.000000	0.000000	0.005761
				(0.17586)
0.000000	1.000000	0.000000	0.000000	3.480395
				(0.82649)
0.000000	0.000000	1.000000	0.000000	0.047466
				(0.15961)
0.000000	0.000000	0.000000	1.000000	0.480810
				(0.32195)

Adjustment coefficients (standard error in parentheses)

D(PSC)	-0.405467	-0.088711	-0.108350	0.378870
	(0.30896)	(0.02141)	(0.25128)	(0.19328)

D(DBT)	5.592329	0.014000	-3.330801	-3.709480
	(1.46653)	(0.10162)	(1.19273)	(0.91741)
D(IN)	0.069335	0.127138	-0.652633	-0.340723
	(0.68901)	(0.04774)	(0.56037)	(0.43102)
D(M3)	-0.369294	0.005810	0.153327	-0.014938
	(0.41521)	(0.02877)	(0.33769)	(0.25974)
D(PX)	-1.258828	-0.184443	0.539617	0.809308
	(0.43049)	(0.02983)	(0.35012)	(0.26930)

APPENDIX F – VECM RESULTS

VECM Result for Benin

Vector Error Correction Estimates
Date: 11/29/18 Time: 05:57
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	CointEq2
PSC(-1)	1.000000	0.000000
DBT(-1)	0.000000	1.000000
IN(-1)	1.874299	-1.557692
	(0.31140)	(0.69897)
	[6.01898]	[-2.22855]
M3(-1)	0.380560	2.091508
	(0.23726)	(0.53256)
	[1.60396]	[3.92724]
PX(-1)	-0.419555	3.340508
	(0.45487)	(1.02100)
	[-0.92237]	[3.27180]
C	8.930764	-470.5288

Error Correction:	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	-0.094539	0.933187	-0.153741	-0.003610	0.069360
	(0.10099)	(0.30372)	(0.26410)	(0.09762)	(0.10205)
	[-0.93616]	[3.07252]	[-0.58213]	[-0.03698]	[0.67964]
CointEq2	-0.074285	0.165138	0.107167	0.014906	-0.145799
	(0.03972)	(0.11945)	(0.10387)	(0.03839)	(0.04014)
	[-1.87035]	[1.38248]	[1.03176]	[0.38825]	[-3.63257]
D(PSC(-1))	-0.237145	0.953608	0.829000	0.101002	-0.568821
	(0.28112)	(0.84549)	(0.73519)	(0.27175)	(0.28409)
	[-0.84356]	[1.12788]	[1.12759]	[0.37167]	[-2.00224]
D(PSC(-2))	-0.035957	-0.200269	-0.032485	0.418929	-0.455650
	(0.23095)	(0.69458)	(0.60397)	(0.22325)	(0.23339)
	[-0.15569]	[-0.28833]	[-0.05379]	[1.87652]	[-1.95235]
D(PSC(-3))	0.315825	-0.077083	-0.284142	0.165096	0.133416
	(0.20178)	(0.60686)	(0.52770)	(0.19505)	(0.20391)
	[1.56519]	[-0.12702]	[-0.53846]	[0.84641]	[0.65429]
D(PSC(-4))	-0.022643	-0.791589	-0.459930	0.273060	-0.013974
	(0.21167)	(0.63660)	(0.55356)	(0.20461)	(0.21390)
	[-0.10698]	[-1.24346]	[-0.83087]	[1.33452]	[-0.06533]
D(DBT(-1))	0.068068	-0.936760	-0.257836	-0.085447	0.060232
	(0.09216)	(0.27718)	(0.24102)	(0.08909)	(0.09313)
	[0.73858]	[-3.37967]	[-1.06978]	[-0.95912]	[0.64672]
D(DBT(-2))	0.176003	-0.061317	0.240218	-0.137942	-0.024351

	(0.08348)	(0.25108)	(0.21833)	(0.08070)	(0.08437)
	[2.10821]	[-0.24421]	[1.10026]	[-1.70929]	[-0.28863]
D(DBT(-3))	0.105853	-0.313238	-0.038237	-0.015038	0.096159
	(0.10499)	(0.31575)	(0.27456)	(0.10149)	(0.10609)
	[1.00826]	[-0.99205]	[-0.13927]	[-0.14818]	[0.90635]
D(DBT(-4))	0.042740	-0.248442	-0.284060	-0.025703	0.113869
	(0.07744)	(0.23290)	(0.20252)	(0.07486)	(0.07826)
	[0.55191]	[-1.06672]	[-1.40262]	[-0.34335]	[1.45505]
D(IN(-1))	0.179235	-0.703106	0.190440	0.036048	-0.328998
	(0.13891)	(0.41779)	(0.36329)	(0.13428)	(0.14038)
	[1.29025]	[-1.68292]	[0.52421]	[0.26845]	[-2.34360]
D(IN(-2))	-0.061864	-1.635534	-0.415596	0.063323	-0.286338
	(0.12926)	(0.38875)	(0.33804)	(0.12495)	(0.13062)
	[-0.47861]	[-4.20715]	[-1.22943]	[0.50679]	[-2.19207]
D(IN(-3))	-0.019814	-0.328687	0.070022	-0.083530	-0.433415
	(0.11823)	(0.35559)	(0.30920)	(0.11429)	(0.11948)
	[-0.16759]	[-0.92436]	[0.22646]	[-0.73085]	[-3.62750]
D(IN(-4))	0.043009	-0.146855	0.452130	0.122795	-0.466673
	(0.11077)	(0.33314)	(0.28969)	(0.10708)	(0.11194)
	[0.38827]	[-0.44082]	[1.56076]	[1.14679]	[-4.16896]
D(M3(-1))	0.268934	-1.881307	-0.339207	-0.280474	0.091649
	(0.30888)	(0.92896)	(0.80777)	(0.29858)	(0.31214)
	[0.87068]	[-2.02519]	[-0.41993]	[-0.93936]	[0.29362]
D(M3(-2))	0.441377	-0.631048	0.266872	0.021654	0.140457
	(0.22705)	(0.68285)	(0.59377)	(0.21948)	(0.22944)
	[1.94399]	[-0.92414]	[0.44945]	[0.09866]	[0.61216]
D(M3(-3))	-0.112684	-0.307208	-0.603307	-0.209371	0.406713
	(0.23666)	(0.71176)	(0.61891)	(0.22877)	(0.23916)
	[-0.47614]	[-0.43162]	[-0.97478]	[-0.91520]	[1.70059]
D(M3(-4))	0.084049	2.208841	0.538931	-0.438608	0.092980
	(0.20135)	(0.60557)	(0.52657)	(0.19464)	(0.20348)
	[0.41742]	[3.64755]	[1.02347]	[-2.25344]	[0.45696]
D(PX(-1))	0.310645	1.004937	0.670770	-0.317534	-0.122105
	(0.15249)	(0.45862)	(0.39879)	(0.14741)	(0.15410)
	[2.03714]	[2.19121]	[1.68200]	[-2.15412]	[-0.79237]
D(PX(-2))	0.095059	-0.475451	0.073731	0.087363	0.130315
	(0.20469)	(0.61562)	(0.53531)	(0.19787)	(0.20686)
	[0.46440]	[-0.77231]	[0.13773]	[0.44152]	[0.62998]
D(PX(-3))	-0.108727	0.535868	0.029207	-0.130708	-0.105908
	(0.17222)	(0.51795)	(0.45039)	(0.16648)	(0.17404)
	[-0.63133]	[1.03458]	[0.06485]	[-0.78514]	[-0.60854]
D(PX(-4))	0.065708	0.966476	0.219443	-0.107462	-0.209829
	(0.16735)	(0.50331)	(0.43765)	(0.16177)	(0.16912)
	[0.39264]	[1.92025]	[0.50141]	[-0.66429]	[-1.24073]
C	-0.301767	0.452948	-0.269416	0.940843	-0.377530
	(0.54730)	(1.64602)	(1.43130)	(0.52906)	(0.55308)
	[-0.55137]	[0.27518]	[-0.18823]	[1.77834]	[-0.68260]

R-squared	0.728204	0.740076	0.636690	0.578213	0.768786
Adj. R-squared	0.396009	0.422392	0.192644	0.062695	0.486190
Sum sq. resids	116.9501	1057.842	799.8516	109.2834	119.4335
S.E. equation	2.548966	7.666093	6.666048	2.464001	2.575887
F-statistic	2.192100	2.329596	1.433838	1.121617	2.720445
Log likelihood	-79.66408	-124.8100	-119.0790	-78.27412	-80.09483
Akaike AIC	5.008004	7.210242	6.930682	4.940201	5.029016
Schwarz SC	5.969276	8.171514	7.891955	5.901473	5.990288
Mean dependent	0.212620	0.152578	-0.362090	0.601215	-0.087877
S.D. dependent	3.279812	10.08689	7.418839	2.545075	3.593566

Determinant resid covariance (dof adj.)	136440.8
Determinant resid covariance	2225.295
Log likelihood	-448.8891
Akaike information criterion	27.99459
Schwarz criterion	33.21890

VECM Result for Burkina Faso

Vector Error Correction Estimates
Date: 11/29/18 Time: 07:55
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	CointEq2
PSC(-1)	1.000000	0.000000
DBT(-1)	0.000000	1.000000
IN(-1)	-0.270730	-0.394670
	(0.19252)	(0.85730)
	[-1.40624]	[-0.46036]
M3(-1)	-0.588931	1.003255
	(0.12953)	(0.57680)
	[-4.54670]	[1.73934]
PX(-1)	-0.829305	6.531923
	(0.27149)	(1.20895)
	[-3.05467]	[5.40297]
C	95.49344	-807.2170

Error Correction:	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	-0.557040	0.819774	0.265104	0.340431	-0.422554
	(0.15253)	(0.63099)	(0.60871)	(0.23001)	(0.22405)
	[-3.65202]	[1.29918]	[0.43552]	[1.48004]	[-1.88599]
CointEq2	-0.087412	0.006300	-0.083368	-0.061490	-0.129714
	(0.02062)	(0.08530)	(0.08229)	(0.03109)	(0.03029)
	[-4.23932]	[0.07386]	[-1.01313]	[-1.97754]	[-4.28273]
D(PSC(-1))	0.550724	-0.809994	-0.431320	0.194008	0.410851
	(0.17539)	(0.72556)	(0.69994)	(0.26449)	(0.25763)

	[3.13999]	[-1.11636]	[-0.61622]	[0.73352]	[1.59474]
D(PSC(-2))	0.150534	-0.314185	0.036589	-0.429457	-0.183688
	(0.18096)	(0.74862)	(0.72219)	(0.27289)	(0.26582)
	[0.83184]	[-0.41968]	[0.05066]	[-1.57371]	[-0.69103]
D(PSC(-3))	0.429247	-0.635415	-1.190460	0.041839	0.191741
	(0.18985)	(0.78539)	(0.75765)	(0.28630)	(0.27887)
	[2.26096]	[-0.80904]	[-1.57125]	[0.14614]	[0.68756]
D(PSC(-4))	0.120943	-0.540610	1.129387	-0.434663	0.417926
	(0.18179)	(0.75203)	(0.72547)	(0.27414)	(0.26703)
	[0.66530]	[-0.71887]	[1.55676]	[-1.58558]	[1.56512]
D(DBT(-1))	-0.009474	0.240122	-0.063691	-0.020536	0.015414
	(0.05070)	(0.20975)	(0.20234)	(0.07646)	(0.07448)
	[-0.18686]	[1.14480]	[-0.31477]	[-0.26858]	[0.20697]
D(DBT(-2))	-0.080997	0.345324	0.048288	0.002888	-0.057565
	(0.04959)	(0.20515)	(0.19791)	(0.07478)	(0.07284)
	[-1.63329]	[1.68325]	[0.24400]	[0.03862]	[-0.79024]
D(DBT(-3))	0.099560	-0.154231	0.017086	0.191585	0.116237
	(0.05269)	(0.21796)	(0.21026)	(0.07945)	(0.07739)
	[1.88964]	[-0.70761]	[0.08126]	[2.41132]	[1.50193]
D(DBT(-4))	0.072541	-0.143592	0.238052	-0.042184	0.271714
	(0.05460)	(0.22588)	(0.21790)	(0.08234)	(0.08020)
	[1.32854]	[-0.63570]	[1.09246]	[-0.51232]	[3.38776]
D(IN(-1))	-0.213644	-0.222630	-0.474357	-0.058962	-0.107272
	(0.06709)	(0.27754)	(0.26774)	(0.10117)	(0.09855)
	[-3.18442]	[-0.80214]	[-1.77170]	[-0.58279]	[-1.08853]
D(IN(-2))	-0.263315	-0.096161	-0.589803	-0.069526	-0.079161
	(0.06848)	(0.28329)	(0.27329)	(0.10327)	(0.10059)
	[-3.84513]	[-0.33944]	[-2.15817]	[-0.67325]	[-0.78696]
D(IN(-3))	-0.187756	0.117503	-0.288182	-0.080980	-0.172786
	(0.06731)	(0.27844)	(0.26861)	(0.10150)	(0.09887)
	[-2.78951]	[0.42200]	[-1.07287]	[-0.79784]	[-1.74766]
D(IN(-4))	-0.232140	0.163818	-0.250148	-0.140521	-0.164322
	(0.05875)	(0.24303)	(0.23445)	(0.08859)	(0.08629)
	[-3.95149]	[0.67406]	[-1.06697]	[-1.58618]	[-1.90423]
D(M3(-1))	-0.028072	0.432970	0.302152	-0.074698	-0.439699
	(0.12902)	(0.53372)	(0.51487)	(0.19456)	(0.18951)
	[-0.21758]	[0.81123]	[0.58685]	[-0.38394]	[-2.32018]
D(M3(-2))	0.023257	0.173296	0.400206	-0.382832	0.051531
	(0.14269)	(0.59030)	(0.56945)	(0.21518)	(0.20960)
	[0.16299]	[0.29357]	[0.70279]	[-1.77913]	[0.24586]
D(M3(-3))	0.132755	-0.576249	0.319518	-0.025466	-0.337933
	(0.13011)	(0.53826)	(0.51925)	(0.19621)	(0.19112)
	[1.02031]	[-1.07058]	[0.61535]	[-0.12979]	[-1.76816]
D(M3(-4))	-0.310868	0.904406	-0.453667	-0.469343	-0.205048
	(0.14034)	(0.58055)	(0.56005)	(0.21163)	(0.20614)
	[-2.21517]	[1.55784]	[-0.81005]	[-2.21780]	[-0.99471]

D(PX(-1))	0.120678	0.886425	0.077966	0.525187	-0.118141
	(0.14190)	(0.58703)	(0.56630)	(0.21399)	(0.20844)
	[0.85042]	[1.51001]	[0.13768]	[2.45427]	[-0.56679]
D(PX(-2))	-0.117095	0.299936	1.025058	0.272402	0.235633
	(0.13632)	(0.56392)	(0.54401)	(0.20557)	(0.20023)
	[-0.85899]	[0.53187]	[1.88427]	[1.32513]	[1.17679]
D(PX(-3))	-0.201718	0.764159	0.884929	0.406356	0.034862
	(0.14974)	(0.61946)	(0.59758)	(0.22581)	(0.21995)
	[-1.34711]	[1.23360]	[1.48086]	[1.79956]	[0.15850]
D(PX(-4))	-0.108832	1.084918	0.411560	0.188849	-0.059295
	(0.13653)	(0.56479)	(0.54484)	(0.20588)	(0.20054)
	[-0.79716]	[1.92094]	[0.75538]	[0.91728]	[-0.29567]
C	-0.052855	0.789642	-0.383306	1.446764	0.037346
	(0.28461)	(1.17738)	(1.13580)	(0.42919)	(0.41806)
	[-0.18571]	[0.67067]	[-0.33748]	[3.37093]	[0.08933]
R-squared	0.792355	0.529109	0.576761	0.646096	0.725119
Adj. R-squared	0.538567	-0.046424	0.059469	0.213546	0.389153
Sum sq. resids	29.57344	506.1085	470.9910	67.25156	63.80858
S.E. equation	1.281783	5.302559	5.115287	1.932925	1.882796
F-statistic	3.122114	0.919337	1.114962	1.493692	2.158309
Log likelihood	-51.47922	-109.6966	-108.2225	-68.32128	-67.24395
Akaike AIC	3.633133	6.473007	6.401095	4.454696	4.402144
Schwarz SC	4.594405	7.434279	7.362367	5.415969	5.363416
Mean dependent	0.423179	0.431366	-0.185369	0.687155	-0.040891
S.D. dependent	1.886950	5.183602	5.274526	2.179608	2.409000

Determinant resid covariance (dof adj.)	8454.245
Determinant resid covariance	137.8853
Log likelihood	-391.8741
Akaike information criterion	25.21337
Schwarz criterion	30.43767

VECM Result for Cote D'Ivoire

Vector Error Correction Estimates
Date: 11/29/18 Time: 07:58
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	CointEq2
PSC(-1)	1.000000	0.000000
DBT(-1)	0.000000	1.000000
IN(-1)	-4.042746	-18.61899
	(0.79932)	(4.45709)
	[-5.05771]	[-4.17739]
M3(-1)	-1.845395	-5.561186
	(1.05294)	(5.87128)
	[-1.75261]	[-0.94718]

PX(-1)	10.27247	57.73234			
	(2.20791)	(12.3115)			
	[4.65258]	[4.68931]			
C	-917.4982	-5280.403			
Error Correction:	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	0.224810	3.374305	0.154592	0.458015	-0.277296
	(0.26721)	(0.99382)	(1.25381)	(0.34371)	(0.38628)
	[0.84133]	[3.39529]	[0.12330]	[1.33256]	[-0.71785]
CointEq2	-0.056125	-0.558279	0.029248	-0.071344	0.047668
	(0.04765)	(0.17722)	(0.22358)	(0.06129)	(0.06888)
	[-1.17789]	[-3.15023]	[0.13082]	[-1.16403]	[0.69203]
D(PSC(-1))	-0.752178	-5.478672	0.589919	-1.097985	1.699591
	(0.70085)	(2.60664)	(3.28855)	(0.90150)	(1.01317)
	[-1.07324]	[-2.10182]	[0.17939]	[-1.21795]	[1.67750]
D(PSC(-2))	-0.357636	-7.527697	-1.576094	-0.317776	0.675130
	(0.56764)	(2.11119)	(2.66349)	(0.73015)	(0.82059)
	[-0.63004]	[-3.56561]	[-0.59174]	[-0.43522]	[0.82273]
D(PSC(-3))	-0.407998	-5.725152	-0.089608	-1.143746	0.490819
	(0.71842)	(2.67202)	(3.37103)	(0.92411)	(1.03858)
	[-0.56791]	[-2.14263]	[-0.02658]	[-1.23767]	[0.47259]
D(PSC(-4))	-0.044453	-2.186445	0.495816	-0.355868	0.027407
	(0.43657)	(1.62371)	(2.04848)	(0.56156)	(0.63111)
	[-0.10183]	[-1.34658]	[0.24204]	[-0.63372]	[0.04343]
D(DBT(-1))	0.028995	-0.528561	-0.136876	-0.083620	0.102717
	(0.04191)	(0.15588)	(0.19666)	(0.05391)	(0.06059)
	[0.69182]	[-3.39085]	[-0.69601]	[-1.55109]	[1.69533]
D(DBT(-2))	0.052326	-0.387519	-0.267181	-0.092878	0.085539
	(0.05110)	(0.19005)	(0.23977)	(0.06573)	(0.07387)
	[1.02401]	[-2.03902]	[-1.11432]	[-1.41305]	[1.15796]
D(DBT(-3))	0.007407	-0.312763	-0.300036	-0.083338	-0.068227
	(0.04064)	(0.15116)	(0.19071)	(0.05228)	(0.05876)
	[0.18225]	[-2.06902]	[-1.57326]	[-1.59407]	[-1.16120]
D(DBT(-4))	0.001026	-0.056662	-0.091669	-0.117015	0.016040
	(0.04581)	(0.17040)	(0.21497)	(0.05893)	(0.06623)
	[0.02240]	[-0.33253]	[-0.42642]	[-1.98562]	[0.24218]
D(IN(-1))	-0.136380	2.320625	0.275696	0.389689	-0.208003
	(0.16960)	(0.63079)	(0.79581)	(0.21816)	(0.24518)
	[-0.80413]	[3.67893]	[0.34644]	[1.78628]	[-0.84837]
D(IN(-2))	-0.160151	1.542885	0.314642	0.341026	-0.082058
	(0.14350)	(0.53373)	(0.67336)	(0.18459)	(0.20745)
	[-1.11601]	[2.89076]	[0.46727]	[1.84748]	[-0.39555]
D(IN(-3))	-0.074089	0.709480	0.509217	0.214336	0.016814
	(0.09971)	(0.37084)	(0.46786)	(0.12826)	(0.14414)
	[-0.74306]	[1.91316]	[1.08841]	[1.67117]	[0.11665]
D(IN(-4))	-0.005476	0.167675	0.223961	0.247768	-0.060732

	(0.07709)	(0.28672)	(0.36172)	(0.09916)	(0.11144)
	[-0.07104]	[0.58481]	[0.61915]	[2.49865]	[-0.54495]
D(M3(-1))	0.337192	1.554017	0.156924	0.473404	-1.392957
	(0.35926)	(1.33617)	(1.68572)	(0.46211)	(0.51935)
	[0.93858]	[1.16303]	[0.09309]	[1.02443]	[-2.68210]
D(M3(-2))	0.125889	3.963435	1.615242	0.283728	-0.202434
	(0.33033)	(1.22859)	(1.55000)	(0.42491)	(0.47754)
	[0.38110]	[3.22600]	[1.04209]	[0.66774]	[-0.42391]
D(M3(-3))	-0.039614	3.034423	1.786148	0.629387	-0.335034
	(0.40826)	(1.51844)	(1.91568)	(0.52515)	(0.59020)
	[-0.09703]	[1.99838]	[0.93238]	[1.19849]	[-0.56766]
D(M3(-4))	-0.348733	2.879309	0.941796	0.389483	0.295715
	(0.31318)	(1.16480)	(1.46952)	(0.40284)	(0.45274)
	[-1.11352]	[2.47194]	[0.64089]	[0.96683]	[0.65316]
D(PX(-1))	0.730187	0.465487	-1.301742	-0.495649	-0.347548
	(0.25864)	(0.96196)	(1.21361)	(0.33269)	(0.37390)
	[2.82317]	[0.48390]	[-1.07262]	[-1.48982]	[-0.92952]
D(PX(-2))	0.588945	2.027506	-0.807533	0.091855	-0.475100
	(0.31588)	(1.17486)	(1.48221)	(0.40632)	(0.45665)
	[1.86444]	[1.72574]	[-0.54482]	[0.22606]	[-1.04040]
D(PX(-3))	0.377755	1.959653	-0.845897	0.235633	-0.350746
	(0.33406)	(1.24246)	(1.56749)	(0.42970)	(0.48293)
	[1.13080]	[1.57724]	[-0.53965]	[0.54836]	[-0.72629]
D(PX(-4))	0.202326	0.200525	-0.507086	-0.091891	-0.350174
	(0.19766)	(0.73516)	(0.92748)	(0.25425)	(0.28575)
	[1.02359]	[0.27276]	[-0.54673]	[-0.36142]	[-1.22547]
C	-0.629639	-6.662998	-1.738352	-0.702377	0.930570
	(0.74700)	(2.77830)	(3.50511)	(0.96087)	(1.07989)
	[-0.84289]	[-2.39823]	[-0.49595]	[-0.73098]	[0.86173]
R-squared	0.654472	0.886174	0.652594	0.374530	0.791205
Adj. R-squared	0.232161	0.747053	0.227986	-0.389932	0.536011
Sum sq. resids	91.50311	1265.764	2014.648	151.3992	191.2287
S.E. equation	2.254663	8.385715	10.57946	2.900184	3.259420
F-statistic	1.549739	6.369823	1.536934	0.489926	3.100410
Log likelihood	-74.63390	-128.4886	-138.0163	-84.95662	-89.74439
Akaike AIC	4.762629	7.389687	7.854456	5.266177	5.499726
Schwarz SC	5.723901	8.350959	8.815728	6.227449	6.460998
Mean dependent	-0.262436	-0.043322	-0.606650	0.154024	-0.056793
S.D. dependent	2.573040	16.67346	12.04067	2.459964	4.785052

Determinant resid covariance (dof adj.)	234546.0
Determinant resid covariance	3825.351
Log likelihood	-459.9952
Akaike information criterion	28.53635
Schwarz criterion	33.76066

VECM Result for Ghana

Vector Error Correction Estimates
Date: 11/29/18 Time: 08:09
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	CointEq2	CointEq3
PSC(-1)	1.000000	0.000000	0.000000
DBT(-1)	0.000000	1.000000	0.000000
IN(-1)	0.000000	0.000000	1.000000
M3(-1)	-0.475847	-0.767800	-0.371285
	(0.17035)	(1.20447)	(0.43051)
	[-2.79331]	[-0.63746]	[-0.86244]
PX(-1)	0.617804	-6.737477	-0.875132
	(0.19274)	(1.36276)	(0.48708)
	[3.20537]	[-4.94401]	[-1.79668]
C	-65.22786	697.3912	71.66123

Error Correction:	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	0.198770	-1.174181	-7.191855	0.142754	0.222869
	(0.16982)	(1.35981)	(2.44575)	(0.21065)	(0.33089)
	[1.17050]	[-0.86349]	[-2.94055]	[0.67768]	[0.67355]
CointEq2	0.007838	-0.124061	-0.125577	0.054678	0.093717
	(0.01815)	(0.14538)	(0.26148)	(0.02252)	(0.03538)
	[0.43172]	[-0.85337]	[-0.48026]	[2.42790]	[2.64924]
CointEq3	0.026975	-0.349177	-2.382956	-0.138853	0.056192
	(0.05759)	(0.46112)	(0.82938)	(0.07143)	(0.11221)
	[0.46844]	[-0.75723]	[-2.87318]	[-1.94378]	[0.50079]
D(PSC(-1))	0.322664	3.175906	5.619850	-0.040573	0.218074
	(0.37462)	(2.99983)	(5.39549)	(0.46471)	(0.72996)
	[0.86130]	[1.05870]	[1.04158]	[-0.08731]	[0.29875]
D(PSC(-2))	-0.397450	2.916086	7.149878	-0.327294	0.118698
	(0.40285)	(3.22583)	(5.80197)	(0.49972)	(0.78495)
	[-0.98660]	[0.90398]	[1.23232]	[-0.65495]	[0.15122]
D(PSC(-3))	-0.169881	-3.680437	5.997557	-0.180260	0.153737
	(0.34653)	(2.77483)	(4.99081)	(0.42986)	(0.67521)
	[-0.49024]	[-1.32636]	[1.20172]	[-0.41935]	[0.22769]
D(PSC(-4))	-0.390247	0.063282	2.857771	-0.414211	-0.013401
	(0.26464)	(2.11915)	(3.81149)	(0.32828)	(0.51566)
	[-1.47462]	[0.02986]	[0.74978]	[-1.26175]	[-0.02599]
D(DBT(-1))	-0.064819	0.091688	-0.074127	0.008677	-0.056183
	(0.03187)	(0.25522)	(0.45905)	(0.03954)	(0.06210)
	[-2.03367]	[0.35925]	[-0.16148]	[0.21945]	[-0.90465]

D(DBT(-2))	0.066007	0.798527	-0.321643	0.031626	-0.152646
	(0.03403)	(0.27253)	(0.49017)	(0.04222)	(0.06632)
	[1.93943]	[2.93004]	[-0.65618]	[0.74911]	[-2.30182]
D(DBT(-3))	-0.013952	0.274383	0.268864	0.006065	-0.086262
	(0.04089)	(0.32742)	(0.58890)	(0.05072)	(0.07967)
	[-0.34121]	[0.83802]	[0.45656]	[0.11957]	[-1.08272]
D(DBT(-4))	0.025704	-0.235665	0.123137	-0.064745	-0.038567
	(0.03765)	(0.30145)	(0.54218)	(0.04670)	(0.07335)
	[0.68280]	[-0.78178]	[0.22711]	[-1.38648]	[-0.52578]
D(IN(-1))	-0.012091	0.249321	0.920614	0.069653	-0.074722
	(0.04569)	(0.36584)	(0.65800)	(0.05667)	(0.08902)
	[-0.26464]	[0.68150]	[1.39911]	[1.22902]	[-0.83937]
D(IN(-2))	-0.018967	0.073217	0.823306	0.063587	-0.108340
	(0.03916)	(0.31357)	(0.56398)	(0.04858)	(0.07630)
	[-0.48437]	[0.23350]	[1.45980]	[1.30902]	[-1.41989]
D(IN(-3))	-0.004068	0.051791	0.544363	0.027743	-0.091704
	(0.03137)	(0.25118)	(0.45177)	(0.03891)	(0.06112)
	[-0.12970]	[0.20619]	[1.20495]	[0.71299]	[-1.50038]
D(IN(-4))	-0.017971	0.047906	0.117155	0.024582	-0.044563
	(0.02256)	(0.18068)	(0.32497)	(0.02799)	(0.04397)
	[-0.79646]	[0.26514]	[0.36051]	[0.87825]	[-1.01359]
D(M3(-1))	-0.213800	-3.726977	-1.387938	-0.026863	0.098433
	(0.18804)	(1.50575)	(2.70824)	(0.23326)	(0.36640)
	[-1.13699]	[-2.47516]	[-0.51249]	[-0.11516]	[0.26865]
D(M3(-2))	0.198774	0.242883	-5.114109	-0.488864	0.536529
	(0.21789)	(1.74478)	(3.13817)	(0.27029)	(0.42456)
	[0.91226]	[0.13921]	[-1.62965]	[-1.80867]	[1.26372]
D(M3(-3))	-0.122433	-2.274624	-4.078026	0.118806	0.250725
	(0.17665)	(1.41451)	(2.54414)	(0.21913)	(0.34420)
	[-0.69309]	[-1.60806]	[-1.60291]	[0.54218]	[0.72843]
D(M3(-4))	0.053637	-0.053478	-2.051232	-0.363532	0.450770
	(0.19111)	(1.53036)	(2.75250)	(0.23707)	(0.37239)
	[0.28066]	[-0.03494]	[-0.74523]	[-1.53342]	[1.21049]
D(PX(-1))	-0.172627	0.357859	1.324274	0.152205	-0.662922
	(0.10089)	(0.80791)	(1.45310)	(0.12516)	(0.19659)
	[-1.71099]	[0.44295]	[0.91134]	[1.21613]	[-3.37211]
D(PX(-2))	0.013896	-0.115617	0.667653	0.014682	-0.685210
	(0.11313)	(0.90590)	(1.62936)	(0.14034)	(0.22044)
	[0.12283]	[-0.12763]	[0.40977]	[0.10462]	[-3.10844]
D(PX(-3))	-0.051297	1.743038	0.716739	0.035990	-0.501250
	(0.11044)	(0.88439)	(1.59066)	(0.13700)	(0.21520)
	[-0.46446]	[1.97090]	[0.45059]	[0.26269]	[-2.32923]
D(PX(-4))	0.099206	1.669671	0.201049	0.013909	-0.173992
	(0.10004)	(0.80111)	(1.44087)	(0.12410)	(0.19494)
	[0.99162]	[2.08421]	[0.13953]	[0.11207]	[-0.89256]
C	0.448450	-0.599445	-2.051440	0.519375	0.537477
	(0.30487)	(2.44125)	(4.39083)	(0.37818)	(0.59404)

	[1.47097]	[-0.24555]	[-0.46721]	[1.37335]	[0.90479]
R-squared	0.538650	0.655861	0.753146	0.806133	0.768813
Adj. R-squared	-0.085530	0.190260	0.419166	0.543843	0.456030
Sum sq. resids	39.82224	2553.449	8260.299	61.27762	151.1915
S.E. equation	1.530518	12.25573	22.04314	1.898569	2.982217
F-statistic	0.862972	1.408634	2.255067	3.073442	2.457975
Log likelihood	-57.57898	-142.8749	-166.9422	-66.41425	-84.92847
Akaike AIC	3.979462	8.140237	9.314253	4.410451	5.313584
Schwarz SC	4.982529	9.143304	10.31732	5.413518	6.316650
Mean dependent	0.360190	0.753613	-0.165049	0.254512	0.196856
S.D. dependent	1.468985	13.61966	28.92328	2.811056	4.043445

Determinant resid covariance (dof adj.)	550345.6
Determinant resid covariance	6744.671
Log likelihood	-471.6208
Akaike information criterion	29.59126
Schwarz criterion	35.23351

VECM Result for Mali

Vector Error Correction Estimates
Date: 11/29/18 Time: 08:11
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
PSC(-1)	1.000000
DBT(-1)	-5.792533 (1.77892) [-3.25621]
IN(-1)	31.82189 (11.2783) [2.82151]
M3(-1)	-57.10147 (23.5083) [-2.42899]
PX(-1)	-63.60437 (22.7398) [-2.79705]
C	8708.875

Error Correction:	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	0.006746 (0.00415) [1.62540]	0.015542 (0.01565) [0.99282]	-0.024445 (0.01326) [-1.84418]	-0.003816 (0.00425) [-0.89836]	0.006795 (0.00468) [1.45159]
D(PSC(-1))	0.059337 (0.24234) [0.24485]	-1.060354 (0.91410) [-1.15999]	0.691495 (0.77403) [0.89337]	0.089823 (0.24803) [0.36214]	-0.212851 (0.27336) [-0.77864]

D(PSC(-2))	-0.356879	1.801948	1.066933	0.144388	-0.290618
	(0.25756)	(0.97153)	(0.82265)	(0.26361)	(0.29053)
	[-1.38559]	[1.85476]	[1.29695]	[0.54773]	[-1.00029]
D(PSC(-3))	-0.119381	-0.086610	-0.480785	0.383820	-0.423978
	(0.21277)	(0.80257)	(0.67958)	(0.21777)	(0.24001)
	[-0.56108]	[-0.10792]	[-0.70747]	[1.76253]	[-1.76652]
D(PSC(-4))	-0.034121	-0.865447	0.138067	0.106334	0.074708
	(0.19230)	(0.72534)	(0.61419)	(0.19681)	(0.21691)
	[-0.17744]	[-1.19317]	[0.22480]	[0.54029]	[0.34442]
D(DBT(-1))	0.021757	-0.092416	0.325663	0.052350	0.094267
	(0.06178)	(0.23305)	(0.19733)	(0.06323)	(0.06969)
	[0.35214]	[-0.39656]	[1.65031]	[0.82788]	[1.35263]
D(DBT(-2))	0.049461	0.274994	-0.174993	-0.037816	-0.021474
	(0.06083)	(0.22945)	(0.19429)	(0.06226)	(0.06862)
	[0.81311]	[1.19851]	[-0.90069]	[-0.60742]	[-0.31295]
D(DBT(-3))	-0.074133	0.349766	-0.210495	0.000920	-0.080025
	(0.05766)	(0.21749)	(0.18416)	(0.05901)	(0.06504)
	[-1.28573]	[1.60822]	[-1.14301]	[0.01559]	[-1.23042]
D(DBT(-4))	0.065640	0.040889	-0.331305	-0.034525	-0.017731
	(0.06442)	(0.24299)	(0.20576)	(0.06593)	(0.07267)
	[1.01893]	[0.16827]	[-1.61019]	[-0.52364]	[-0.24401]
D(IN(-1))	-0.150497	-0.472190	-0.037374	0.123351	-0.208761
	(0.11813)	(0.44558)	(0.37730)	(0.12090)	(0.13325)
	[-1.27401]	[-1.05972]	[-0.09906]	[1.02025]	[-1.56669]
D(IN(-2))	-0.172801	0.038472	0.062477	0.011160	-0.018842
	(0.11599)	(0.43751)	(0.37047)	(0.11871)	(0.13084)
	[-1.48979]	[0.08793]	[0.16864]	[0.09401]	[-0.14401]
D(IN(-3))	-0.044012	0.163344	-0.137018	0.098148	-0.165915
	(0.09652)	(0.36406)	(0.30828)	(0.09878)	(0.10887)
	[-0.45600]	[0.44867]	[-0.44447]	[0.99356]	[-1.52393]
D(IN(-4))	-0.081706	0.393803	-0.125507	0.068512	-0.086674
	(0.07415)	(0.27969)	(0.23683)	(0.07589)	(0.08364)
	[-1.10191]	[1.40800]	[-0.52995]	[0.90277]	[-1.03626]
D(M3(-1))	0.415749	0.340072	-0.379345	0.068527	-0.370383
	(0.30512)	(1.15089)	(0.97453)	(0.31228)	(0.34417)
	[1.36259]	[0.29549]	[-0.38926]	[0.21944]	[-1.07615]
D(M3(-2))	0.309449	0.036067	-0.700043	-0.360315	0.668404
	(0.26380)	(0.99505)	(0.84257)	(0.27000)	(0.29757)
	[1.17303]	[0.03625]	[-0.83084]	[-1.33452]	[2.24620]
D(M3(-3))	0.290561	-2.274231	-0.834299	0.228183	-0.289274
	(0.27499)	(1.03726)	(0.87831)	(0.28145)	(0.31019)
	[1.05661]	[-2.19253]	[-0.94989]	[0.81075]	[-0.93256]
D(M3(-4))	0.187766	0.605008	0.515185	-0.482545	0.166097
	(0.23275)	(0.87793)	(0.74340)	(0.23822)	(0.26254)
	[0.80672]	[0.68913]	[0.69301]	[-2.02566]	[0.63264]
D(PX(-1))	0.344911	0.791706	-0.780019	-0.381460	-0.140943

	(0.26507)	(0.99983)	(0.84662)	(0.27129)	(0.29900)
	[1.30121]	[0.79184]	[-0.92133]	[-1.40608]	[-0.47138]
D(PX(-2))	0.299833	-0.075553	-0.487094	-0.029656	-0.088653
	(0.22880)	(0.86303)	(0.73078)	(0.23417)	(0.25809)
	[1.31045]	[-0.08754]	[-0.66654]	[-0.12664]	[-0.34350]
D(PX(-3))	0.142337	-0.620153	-0.560135	-0.111755	-0.088878
	(0.17103)	(0.64514)	(0.54628)	(0.17505)	(0.19293)
	[0.83221]	[-0.96127]	[-1.02537]	[-0.63842]	[-0.46068]
D(PX(-4))	0.087982	-0.073626	0.269610	-0.198082	0.098042
	(0.14846)	(0.55998)	(0.47417)	(0.15194)	(0.16746)
	[0.59263]	[-0.13148]	[0.56859]	[-1.30365]	[0.58546]
C	-0.187189	-0.029634	-0.472706	0.257377	-0.583684
	(0.44601)	(1.68234)	(1.42454)	(0.45648)	(0.50310)
	[-0.41970]	[-0.01761]	[-0.33183]	[0.56383]	[-1.16017]
R-squared	0.437437	0.587194	0.656109	0.522844	0.754178
Adj. R-squared	-0.184342	0.130934	0.276019	-0.004540	0.482481
Sum sq. resids	143.9805	2048.513	1468.795	150.8202	183.1999
S.E. equation	2.752802	10.38347	8.792326	2.817429	3.105173
F-statistic	0.703525	1.286973	1.726192	0.991392	2.775802
Log likelihood	-83.92665	-138.3581	-131.5383	-84.87807	-88.86510
Akaike AIC	5.167153	7.822345	7.489673	5.213564	5.408054
Schwarz SC	6.086631	8.741823	8.409151	6.133042	6.327531
Mean dependent	-0.051444	-0.866053	-0.050239	0.254512	-0.508807
S.D. dependent	2.529510	11.13823	10.33332	2.811056	4.316410

Determinant resid covariance (dof adj.)	1211415.
Determinant resid covariance	25890.57
Log likelihood	-499.1959
Akaike information criterion	29.96078
Schwarz criterion	34.76714

VECM Result for Niger

Vector Error Correction Estimates
Date: 11/29/18 Time: 08:13
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	CointEq2
PSC(-1)	1.000000	0.000000
DBT(-1)	0.000000	1.000000
IN(-1)	-0.220518	9.887138
	(0.22993)	(2.39111)
	[-0.95908]	[4.13495]
M3(-1)	-2.072623	-5.251464
	(0.26357)	(2.74101)

	[-7.86356]	[-1.91589]			
PX(-1)	1.449150 (0.19782) [7.32564]	6.887572 (2.05721) [3.34802]			
C	-139.5272	-788.0472			

Error Correction:	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	0.203446 (0.10435) [1.94967]	-0.676641 (0.84016) [-0.80537]	-0.673688 (0.54140) [-1.24434]	0.531408 (0.09170) [5.79537]	-0.651514 (0.19725) [-3.30293]
CointEq2	-0.006913 (0.01231) [-0.56174]	-0.030806 (0.09909) [-0.31090]	-0.046295 (0.06385) [-0.72505]	-0.037589 (0.01081) [-3.47588]	0.053720 (0.02326) [2.30921]
D(PSC(-1))	0.014702 (0.27388) [0.05368]	3.218096 (2.20517) [1.45934]	1.507746 (1.42101) [1.06104]	-0.714144 (0.24067) [-2.96729]	1.001892 (0.51773) [1.93517]
D(PSC(-2))	-0.399577 (0.26658) [-1.49892]	2.002541 (2.14634) [0.93300]	2.186586 (1.38310) [1.58093]	-0.469476 (0.23425) [-2.00416]	1.743981 (0.50392) [3.46086]
D(PSC(-3))	-0.129092 (0.29954) [-0.43097]	4.513943 (2.41176) [1.87164]	2.757706 (1.55414) [1.77443]	-0.160398 (0.26322) [-0.60937]	0.431102 (0.56623) [0.76135]
D(PSC(-4))	0.100671 (0.29508) [0.34116]	2.533821 (2.37584) [1.06649]	1.656520 (1.53099) [1.08199]	-0.634750 (0.25930) [-2.44794]	0.272955 (0.55780) [0.48934]
D(DBT(-1))	-0.016757 (0.02973) [-0.56370]	-0.147396 (0.23935) [-0.61582]	0.038057 (0.15424) [0.24674]	0.006718 (0.02612) [0.25718]	-0.047114 (0.05619) [-0.83840]
D(DBT(-2))	-0.049763 (0.02644) [-1.88210]	0.148100 (0.21288) [0.69569]	0.005121 (0.13718) [0.03733]	-0.005273 (0.02323) [-0.22695]	-0.109148 (0.04998) [-2.18383]
D(DBT(-3))	-0.022002 (0.02976) [-0.73939]	0.182632 (0.23958) [0.76229]	-0.090334 (0.15439) [-0.58512]	0.010168 (0.02615) [0.38885]	-0.171668 (0.05625) [-3.05192]
D(DBT(-4))	-0.007585 (0.03047) [-0.24894]	-0.204913 (0.24534) [-0.83523]	-0.176278 (0.15809) [-1.11501]	0.014373 (0.02678) [0.53679]	-0.010044 (0.05760) [-0.17438]
D(IN(-1))	0.070738 (0.12604) [0.56124]	-0.167362 (1.01479) [-0.16492]	-0.615183 (0.65393) [-0.94075]	0.436350 (0.11075) [3.93982]	-0.496809 (0.23825) [-2.08523]
D(IN(-2))	0.118214 (0.09548) [1.23810]	-0.210797 (0.76876) [-0.27421]	-0.418213 (0.49539) [-0.84422]	0.336097 (0.08390) [4.00584]	-0.304604 (0.18049) [-1.68767]
D(IN(-3))	0.035436 (0.06605) [0.53647]	-0.243106 (0.53184) [-0.45711]	-0.172499 (0.34272) [-0.50333]	0.233552 (0.05804) [4.02366]	-0.178731 (0.12486) [-1.43141]

D(IN(-4))	0.043532	-0.023793	0.055790	0.105390	-0.076499
	(0.04425)	(0.35630)	(0.22960)	(0.03889)	(0.08365)
	[0.98372]	[-0.06678]	[0.24299]	[2.71022]	[-0.91451]
D(M3(-1))	-0.042067	-2.452546	-2.154095	0.133751	0.105650
	(0.23190)	(1.86714)	(1.20319)	(0.20378)	(0.43837)
	[-0.18140]	[-1.31353]	[-1.79033]	[0.65635]	[0.24101]
D(M3(-2))	0.145339	-2.338513	-0.751374	0.097750	-0.254106
	(0.22614)	(1.82079)	(1.17332)	(0.19872)	(0.42748)
	[0.64268]	[-1.28434]	[-0.64038]	[0.49189]	[-0.59442]
D(M3(-3))	-0.057736	-3.647716	-1.440553	3.81E-05	-0.160648
	(0.20043)	(1.61378)	(1.03992)	(0.17613)	(0.37888)
	[-0.28806]	[-2.26036]	[-1.38525]	[0.00022]	[-0.42400]
D(M3(-4))	0.083687	0.842160	-0.410319	0.236781	0.196892
	(0.23003)	(1.85211)	(1.19350)	(0.20214)	(0.43484)
	[0.36380]	[0.45470]	[-0.34380]	[1.17138]	[0.45280]
D(PX(-1))	-0.165137	0.194588	0.185151	-0.385913	-0.097171
	(0.11557)	(0.93050)	(0.59962)	(0.10155)	(0.21846)
	[-1.42890]	[0.20912]	[0.30878]	[-3.80004]	[-0.44479]
D(PX(-2))	-0.176920	-0.232360	0.385730	-0.331430	-0.008636
	(0.09369)	(0.75436)	(0.48611)	(0.08233)	(0.17711)
	[-1.88832]	[-0.30802]	[0.79351]	[-4.02561]	[-0.04876]
D(PX(-3))	-0.204473	-0.111829	0.085696	-0.302119	-0.065836
	(0.09227)	(0.74291)	(0.47873)	(0.08108)	(0.17442)
	[-2.21605]	[-0.15053]	[0.17901]	[-3.72616]	[-0.37746]
D(PX(-4))	-0.144732	0.465181	0.412448	-0.154475	-0.233753
	(0.08158)	(0.65683)	(0.42326)	(0.07169)	(0.15421)
	[-1.77415]	[0.70823]	[0.97446]	[-2.15489]	[-1.51581]
C	0.522650	1.403634	-0.401262	1.319281	-0.465843
	(0.36159)	(2.91133)	(1.87607)	(0.31774)	(0.68352)
	[1.44542]	[0.48213]	[-0.21388]	[4.15204]	[-0.68153]
R-squared	0.640911	0.460140	0.675775	0.794126	0.794303
Adj. R-squared	0.202023	-0.199690	0.279501	0.542503	0.542897
Sum sq. resids	41.90819	2716.752	1128.138	32.36069	149.7512
S.E. equation	1.525855	12.28538	7.916713	1.340827	2.884356
F-statistic	1.460308	0.697362	1.705322	3.156015	3.159434
Log likelihood	-58.62562	-144.1457	-126.1289	-53.32561	-84.73224
Akaike AIC	3.981738	8.153449	7.274580	3.723201	5.255231
Schwarz SC	4.943010	9.114721	8.235852	4.684473	6.216503
Mean dependent	0.136099	0.771515	-0.185875	0.442196	0.135615
S.D. dependent	1.708119	11.21642	9.326704	1.982342	4.266204

Determinant resid covariance (dof adj.)	108312.5
Determinant resid covariance	1766.534
Log likelihood	-444.1563
Akaike information criterion	27.76372
Schwarz criterion	32.98803

VECM Result for Nigeria

Vector Error Correction Estimates
Date: 11/29/18 Time: 08:15
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	CointEq2
PSC(-1)	1.000000	0.000000
DBT(-1)	0.000000	1.000000
IN(-1)	0.320230	-0.298655
	(0.06189)	(0.04500)
	[5.17448]	[-6.63712]
PX(-1)	0.403908	0.235576
	(0.09470)	(0.06886)
	[4.26517]	[3.42128]
M3(-1)	-0.993065	0.375010
	(0.11462)	(0.08334)
	[-8.66423]	[4.49987]
C	-34.56586	-28.80793

Error Correction:	D(PSC)	D(DBT)	D(IN)	D(PX)	D(M3)
CointEq1	-0.682914	-0.528095	1.006037	-0.888796	-0.539105
	(0.27844)	(0.24980)	(1.23301)	(0.54021)	(0.30963)
	[-2.45261]	[-2.11405]	[0.81592]	[-1.64527]	[-1.74115]
CointEq2	-1.158247	-0.321959	5.990950	-2.158056	-1.122588
	(0.25309)	(0.22706)	(1.12073)	(0.49102)	(0.28143)
	[-4.57644]	[-1.41797]	[5.34557]	[-4.39503]	[-3.98884]
D(PSC(-1))	0.485555	0.079304	-1.635293	0.640568	0.417543
	(0.32620)	(0.29265)	(1.44448)	(0.63287)	(0.36273)
	[1.48852]	[0.27099]	[-1.13209]	[1.01217]	[1.15111]
D(PSC(-2))	0.500205	0.489512	-4.698548	2.472840	0.774262
	(0.33569)	(0.30116)	(1.48651)	(0.65128)	(0.37329)
	[1.49007]	[1.62541]	[-3.16078]	[3.79689]	[2.07418]
D(PSC(-3))	1.128857	-0.093429	-0.803750	0.823736	0.770515
	(0.38407)	(0.34456)	(1.70072)	(0.74513)	(0.42708)
	[2.93923]	[-0.27115]	[-0.47259]	[1.10549]	[1.80416]
D(PSC(-4))	1.268588	0.450370	-9.067409	1.748997	1.639438
	(0.39088)	(0.35067)	(1.73088)	(0.75834)	(0.43465)
	[3.24549]	[1.28431]	[-5.23860]	[2.30634]	[3.77185]
D(DBT(-1))	0.870120	0.106746	-8.373721	1.705604	1.021449
	(0.37206)	(0.33379)	(1.64756)	(0.72184)	(0.41373)
	[2.33865]	[0.31980]	[-5.08249]	[2.36286]	[2.46889]
D(DBT(-2))	0.757648	-0.163562	-2.258652	2.771394	0.446493
	(0.33616)	(0.30159)	(1.48860)	(0.65220)	(0.37381)

	[2.25380]	[-0.54234]	[-1.51729]	[4.24933]	[1.19444]
D(DBT(-3))	2.149275	-0.152238	-8.667374	1.476281	2.079489
	(0.41028)	(0.36808)	(1.81679)	(0.79598)	(0.45622)
	[5.23860]	[-0.41360]	[-4.77071]	[1.85467]	[4.55805]
D(DBT(-4))	1.021992	0.219531	-7.932043	2.608109	0.910126
	(0.45138)	(0.40495)	(1.99879)	(0.87572)	(0.50193)
	[2.26416]	[0.54212]	[-3.96842]	[2.97824]	[1.81327]
D(IN(-1))	-0.221797	0.052529	1.485872	-0.420879	-0.215583
	(0.07751)	(0.06954)	(0.34323)	(0.15038)	(0.08619)
	[-2.86150]	[0.75540]	[4.32902]	[-2.79877]	[-2.50122]
D(IN(-2))	-0.047167	-0.003570	0.532493	-0.171203	-0.105942
	(0.06623)	(0.05942)	(0.29330)	(0.12850)	(0.07365)
	[-0.71212]	[-0.06007]	[1.81552]	[-1.33229]	[-1.43842]
D(IN(-3))	0.001597	0.023812	0.130533	-0.006298	-0.013826
	(0.04364)	(0.03915)	(0.19326)	(0.08467)	(0.04853)
	[0.03659]	[0.60816]	[0.67543]	[-0.07438]	[-0.28490]
D(IN(-4))	0.028067	0.002576	-0.017741	-0.014524	-0.000503
	(0.02647)	(0.02375)	(0.11722)	(0.05136)	(0.02944)
	[1.06028]	[0.10846]	[-0.15134]	[-0.28280]	[-0.01709]
D(PX(-1))	-0.029280	0.229570	0.861197	-0.031692	-0.061109
	(0.15280)	(0.13708)	(0.67662)	(0.29645)	(0.16991)
	[-0.19162]	[1.67470]	[1.27279]	[-0.10691]	[-0.35965]
D(PX(-2))	0.237100	0.139831	0.614167	-0.489972	0.125739
	(0.14641)	(0.13135)	(0.64835)	(0.28406)	(0.16281)
	[1.61938]	[1.06453]	[0.94727]	[-1.72489]	[0.77230]
D(PX(-3))	-0.003700	0.239406	0.224334	-0.001563	-0.053210
	(0.11195)	(0.10044)	(0.49575)	(0.21720)	(0.12449)
	[-0.03305]	[2.38364]	[0.45252]	[-0.00720]	[-0.42743]
D(PX(-4))	0.094175	0.053469	1.360077	-0.509057	0.004512
	(0.11734)	(0.10527)	(0.51961)	(0.22766)	(0.13048)
	[0.80257]	[0.50791]	[2.61748]	[-2.23608]	[0.03458]
D(M3(-1))	-0.368173	-0.124094	5.494276	-0.957693	-0.129089
	(0.35484)	(0.31834)	(1.57132)	(0.68844)	(0.39458)
	[-1.03756]	[-0.38981]	[3.49659]	[-1.39111]	[-0.32715]
D(M3(-2))	0.163283	-0.509199	-0.815330	-0.209235	-0.324917
	(0.41078)	(0.36853)	(1.81903)	(0.79696)	(0.45678)
	[0.39749]	[-1.38171]	[-0.44822]	[-0.26254]	[-0.71131]
D(M3(-3))	-0.713293	0.224457	-0.511313	-0.557455	-0.225844
	(0.41353)	(0.37100)	(1.83121)	(0.80230)	(0.45984)
	[-1.72487]	[0.60501]	[-0.27922]	[-0.69482]	[-0.49113]
D(M3(-4))	-1.415626	-0.403351	8.084781	-1.283770	-1.658819
	(0.39747)	(0.35659)	(1.76008)	(0.77114)	(0.44198)
	[-3.56159]	[-1.13114]	[4.59341]	[-1.66477]	[-3.75313]
C	0.391569	0.237098	-0.599463	-0.075144	0.159958
	(0.54078)	(0.48516)	(2.39469)	(1.04917)	(0.60134)
	[0.72408]	[0.48871]	[-0.25033]	[-0.07162]	[0.26600]

R-squared	0.800508	0.467680	0.927663	0.822722	0.789370
Adj. R-squared	0.556683	-0.182934	0.839251	0.606050	0.531933
Sum sq. resids	194.0810	156.2081	3805.740	730.5270	239.9847
S.E. equation	3.283638	2.945883	14.54063	6.370623	3.651367
F-statistic	3.283135	0.718829	10.49250	3.797074	3.066268
Log likelihood	-90.04790	-85.59763	-151.0557	-117.2205	-94.40004
Akaike AIC	5.514532	5.297445	8.490522	6.840022	5.726831
Schwarz SC	6.475804	6.258718	9.451794	7.801295	6.688103
Mean dependent	0.232158	-0.011918	-1.002017	0.291112	0.154089
S.D. dependent	4.931718	2.708540	36.26679	10.14988	5.337055

Determinant resid covariance (dof adj.)	954993.6
Determinant resid covariance	15575.56
Log likelihood	-488.7783
Akaike information criterion	29.94040
Schwarz criterion	35.16471

VECM Result for Senegal

Vector Error Correction Estimates
Date: 11/29/18 Time: 08:17
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	CointEq2
PSC(-1)	1.000000	0.000000
DBT(-1)	0.000000	1.000000
IN(-1)	-3.502119	2.406379
	(0.91602)	(0.45937)
	[-3.82318]	[5.23845]
M3(-1)	-3.487963	0.590256
	(1.18692)	(0.59522)
	[-2.93867]	[0.99166]
PX(-1)	2.379255	0.304215
	(1.04184)	(0.52246)
	[2.28371]	[0.58227]
C	-184.2778	-116.9510

Error Correction:	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	-0.106872	-0.065506	0.271735	-0.076519	-0.050253
	(0.05462)	(0.13984)	(0.14390)	(0.04087)	(0.05614)
	[-1.95664]	[-0.46844]	[1.88834]	[-1.87230]	[-0.89518]
CointEq2	-0.003150	-0.801156	-0.230995	-0.033864	0.077111
	(0.07196)	(0.18424)	(0.18959)	(0.05384)	(0.07396)
	[-0.04378]	[-4.34848]	[-1.21839]	[-0.62892]	[1.04259]
D(PSC(-1))	-0.018726	-2.032667	-0.484318	0.045163	0.052779
	(0.35182)	(0.90073)	(0.92689)	(0.26324)	(0.36159)
	[-0.05323]	[-2.25669]	[-0.52252]	[0.17156]	[0.14596]

D(PSC(-2))	-0.339680	-0.439567	-0.180398	-0.144626	0.167276
	(0.33706)	(0.86294)	(0.88800)	(0.25220)	(0.34642)
	[-1.00778]	[-0.50938]	[-0.20315]	[-0.57346]	[0.48287]
D(PSC(-3))	0.464893	-1.666046	-0.872104	0.237852	0.725394
	(0.32300)	(0.82695)	(0.85097)	(0.24168)	(0.33197)
	[1.43930]	[-2.01468]	[-1.02483]	[0.98416]	[2.18511]
D(PSC(-4))	0.307010	-0.930170	-1.057568	0.561640	0.294217
	(0.34980)	(0.89558)	(0.92159)	(0.26174)	(0.35952)
	[0.87766]	[-1.03863]	[-1.14755]	[2.14581]	[0.81836]
D(DBT(-1))	-0.047090	0.326004	0.184935	-0.037924	-0.183195
	(0.06760)	(0.17306)	(0.17809)	(0.05058)	(0.06947)
	[-0.69664]	[1.88375]	[1.03845]	[-0.74980]	[-2.63690]
D(DBT(-2))	-0.035510	0.671394	0.193557	-0.052964	-0.131723
	(0.08453)	(0.21641)	(0.22270)	(0.06325)	(0.08688)
	[-0.42010]	[3.10242]	[0.86916]	[-0.83741]	[-1.51623]
D(DBT(-3))	-0.039397	0.892451	0.332779	-0.088643	0.065860
	(0.08692)	(0.22253)	(0.22899)	(0.06503)	(0.08933)
	[-0.45328]	[4.01055]	[1.45325]	[-1.36301]	[0.73727]
D(DBT(-4))	-0.042308	0.160629	-0.041136	0.033942	-0.120136
	(0.09298)	(0.23806)	(0.24497)	(0.06957)	(0.09557)
	[-0.45500]	[0.67474]	[-0.16792]	[0.48786]	[-1.25710]
D(IN(-1))	-0.302319	0.740438	0.477527	-0.180496	-0.185102
	(0.18130)	(0.46416)	(0.47764)	(0.13565)	(0.18633)
	[-1.66753]	[1.59521]	[0.99975]	[-1.33056]	[-0.99339]
D(IN(-2))	-0.335963	-0.062847	0.276979	-0.210307	-0.230023
	(0.13770)	(0.35255)	(0.36279)	(0.10303)	(0.14153)
	[-2.43977]	[-0.17826]	[0.76347]	[-2.04113]	[-1.62529]
D(IN(-3))	-0.121011	-0.559507	-0.031175	-0.127957	-0.093613
	(0.14272)	(0.36539)	(0.37600)	(0.10679)	(0.14668)
	[-0.84790]	[-1.53126]	[-0.08291]	[-1.19824]	[-0.63821]
D(IN(-4))	-0.016060	-0.089228	0.003958	-0.035472	0.099901
	(0.10872)	(0.27835)	(0.28644)	(0.08135)	(0.11174)
	[-0.14772]	[-0.32055]	[0.01382]	[-0.43604]	[0.89403]
D(M3(-1))	0.000900	-3.347379	-0.345245	-0.601025	-0.218004
	(0.43928)	(1.12465)	(1.15732)	(0.32869)	(0.45148)
	[0.00205]	[-2.97638]	[-0.29832]	[-1.82857]	[-0.48287]
D(M3(-2))	0.319459	-3.068962	0.006516	-0.432996	0.426038
	(0.45079)	(1.15413)	(1.18765)	(0.33730)	(0.46331)
	[0.70866]	[-2.65912]	[0.00549]	[-1.28371]	[0.91955]
D(M3(-3))	-0.114474	-2.324705	0.050755	-0.322249	0.204195
	(0.38490)	(0.98542)	(1.01405)	(0.28800)	(0.39559)
	[-0.29741]	[-2.35909]	[0.05005]	[-1.11894]	[0.51618]
D(M3(-4))	0.226681	-2.567216	-0.153493	-0.169548	0.301967
	(0.36361)	(0.93093)	(0.95797)	(0.27207)	(0.37371)
	[0.62341]	[-2.75770]	[-0.16023]	[-0.62318]	[0.80802]
D(PX(-1))	-0.013693	2.272709	0.543284	-0.188414	-0.086267

	(0.27306)	(0.69909)	(0.71940)	(0.20431)	(0.28064)
	[-0.05015]	[3.25095]	[0.75519]	[-0.92218]	[-0.30739]
D(PX(-2))	0.121405	1.520420	0.191174	0.102598	-0.190252
	(0.24001)	(0.61447)	(0.63232)	(0.17958)	(0.24667)
	[0.50584]	[2.47434]	[0.30234]	[0.57131]	[-0.77127]
D(PX(-3))	-0.148492	1.345477	0.326882	0.132767	-0.182258
	(0.22759)	(0.58268)	(0.59960)	(0.17029)	(0.23391)
	[-0.65245]	[2.30912]	[0.54516]	[0.77965]	[-0.77918]
D(PX(-4))	-0.276504	1.256973	0.617751	-0.159375	-0.244556
	(0.18882)	(0.48343)	(0.49747)	(0.14129)	(0.19407)
	[-1.46435]	[2.60010]	[1.24178]	[-1.12803]	[-1.26015]
C	-0.063327	5.925570	0.013157	1.329370	-0.192148
	(0.78280)	(2.00415)	(2.06236)	(0.58572)	(0.80454)
	[-0.08090]	[2.95666]	[0.00638]	[2.26962]	[-0.23883]
R-squared	0.587787	0.762657	0.611848	0.563079	0.627724
Adj. R-squared	0.083972	0.472572	0.137440	0.029065	0.172721
Sum sq. resids	124.0867	813.3572	861.2925	69.47174	131.0754
S.E. equation	2.625586	6.722091	6.917339	1.964571	2.698511
F-statistic	1.166673	2.629078	1.289710	1.054427	1.379603
Log likelihood	-80.87835	-119.4222	-120.5962	-68.98711	-82.00159
Akaike AIC	5.067236	6.947427	7.004690	4.487176	5.122029
Schwarz SC	6.028509	7.908699	7.965963	5.448448	6.083301
Mean dependent	0.258664	0.658576	-0.408030	0.651659	0.312191
S.D. dependent	2.743292	9.255987	7.448084	1.993759	2.966868

Determinant resid covariance (dof adj.)	72017.40
Determinant resid covariance	1174.575
Log likelihood	-435.7900
Akaike information criterion	27.35561
Schwarz criterion	32.57991

VECM Result for Senegal

Vector Error Correction Estimates
Date: 11/29/18 Time: 08:17
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	CointEq2
PSC(-1)	1.000000	0.000000
DBT(-1)	0.000000	1.000000
IN(-1)	-3.502119	2.406379
	(0.91602)	(0.45937)
	[-3.82318]	[5.23845]
M3(-1)	-3.487963	0.590256
	(1.18692)	(0.59522)
	[-2.93867]	[0.99166]

PX(-1)	2.379255	0.304215			
	(1.04184)	(0.52246)			
	[2.28371]	[0.58227]			
C	-184.2778	-116.9510			

Error Correction:	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	-0.106872	-0.065506	0.271735	-0.076519	-0.050253
	(0.05462)	(0.13984)	(0.14390)	(0.04087)	(0.05614)
	[-1.95664]	[-0.46844]	[1.88834]	[-1.87230]	[-0.89518]
CointEq2	-0.003150	-0.801156	-0.230995	-0.033864	0.077111
	(0.07196)	(0.18424)	(0.18959)	(0.05384)	(0.07396)
	[-0.04378]	[-4.34848]	[-1.21839]	[-0.62892]	[1.04259]
D(PSC(-1))	-0.018726	-2.032667	-0.484318	0.045163	0.052779
	(0.35182)	(0.90073)	(0.92689)	(0.26324)	(0.36159)
	[-0.05323]	[-2.25669]	[-0.52252]	[0.17156]	[0.14596]
D(PSC(-2))	-0.339680	-0.439567	-0.180398	-0.144626	0.167276
	(0.33706)	(0.86294)	(0.88800)	(0.25220)	(0.34642)
	[-1.00778]	[-0.50938]	[-0.20315]	[-0.57346]	[0.48287]
D(PSC(-3))	0.464893	-1.666046	-0.872104	0.237852	0.725394
	(0.32300)	(0.82695)	(0.85097)	(0.24168)	(0.33197)
	[1.43930]	[-2.01468]	[-1.02483]	[0.98416]	[2.18511]
D(PSC(-4))	0.307010	-0.930170	-1.057568	0.561640	0.294217
	(0.34980)	(0.89558)	(0.92159)	(0.26174)	(0.35952)
	[0.87766]	[-1.03863]	[-1.14755]	[2.14581]	[0.81836]
D(DBT(-1))	-0.047090	0.326004	0.184935	-0.037924	-0.183195
	(0.06760)	(0.17306)	(0.17809)	(0.05058)	(0.06947)
	[-0.69664]	[1.88375]	[1.03845]	[-0.74980]	[-2.63690]
D(DBT(-2))	-0.035510	0.671394	0.193557	-0.052964	-0.131723
	(0.08453)	(0.21641)	(0.22270)	(0.06325)	(0.08688)
	[-0.42010]	[3.10242]	[0.86916]	[-0.83741]	[-1.51623]
D(DBT(-3))	-0.039397	0.892451	0.332779	-0.088643	0.065860
	(0.08692)	(0.22253)	(0.22899)	(0.06503)	(0.08933)
	[-0.45328]	[4.01055]	[1.45325]	[-1.36301]	[0.73727]
D(DBT(-4))	-0.042308	0.160629	-0.041136	0.033942	-0.120136
	(0.09298)	(0.23806)	(0.24497)	(0.06957)	(0.09557)
	[-0.45500]	[0.67474]	[-0.16792]	[0.48786]	[-1.25710]
D(IN(-1))	-0.302319	0.740438	0.477527	-0.180496	-0.185102
	(0.18130)	(0.46416)	(0.47764)	(0.13565)	(0.18633)
	[-1.66753]	[1.59521]	[0.99975]	[-1.33056]	[-0.99339]
D(IN(-2))	-0.335963	-0.062847	0.276979	-0.210307	-0.230023
	(0.13770)	(0.35255)	(0.36279)	(0.10303)	(0.14153)
	[-2.43977]	[-0.17826]	[0.76347]	[-2.04113]	[-1.62529]
D(IN(-3))	-0.121011	-0.559507	-0.031175	-0.127957	-0.093613
	(0.14272)	(0.36539)	(0.37600)	(0.10679)	(0.14668)
	[-0.84790]	[-1.53126]	[-0.08291]	[-1.19824]	[-0.63821]
D(IN(-4))	-0.016060	-0.089228	0.003958	-0.035472	0.099901
	(0.10872)	(0.27835)	(0.28644)	(0.08135)	(0.11174)

	[-0.14772]	[-0.32055]	[0.01382]	[-0.43604]	[0.89403]
D(M3(-1))	0.000900	-3.347379	-0.345245	-0.601025	-0.218004
	(0.43928)	(1.12465)	(1.15732)	(0.32869)	(0.45148)
	[0.00205]	[-2.97638]	[-0.29832]	[-1.82857]	[-0.48287]
D(M3(-2))	0.319459	-3.068962	0.006516	-0.432996	0.426038
	(0.45079)	(1.15413)	(1.18765)	(0.33730)	(0.46331)
	[0.70866]	[-2.65912]	[0.00549]	[-1.28371]	[0.91955]
D(M3(-3))	-0.114474	-2.324705	0.050755	-0.322249	0.204195
	(0.38490)	(0.98542)	(1.01405)	(0.28800)	(0.39559)
	[-0.29741]	[-2.35909]	[0.05005]	[-1.11894]	[0.51618]
D(M3(-4))	0.226681	-2.567216	-0.153493	-0.169548	0.301967
	(0.36361)	(0.93093)	(0.95797)	(0.27207)	(0.37371)
	[0.62341]	[-2.75770]	[-0.16023]	[-0.62318]	[0.80802]
D(PX(-1))	-0.013693	2.272709	0.543284	-0.188414	-0.086267
	(0.27306)	(0.69909)	(0.71940)	(0.20431)	(0.28064)
	[-0.05015]	[3.25095]	[0.75519]	[-0.92218]	[-0.30739]
D(PX(-2))	0.121405	1.520420	0.191174	0.102598	-0.190252
	(0.24001)	(0.61447)	(0.63232)	(0.17958)	(0.24667)
	[0.50584]	[2.47434]	[0.30234]	[0.57131]	[-0.77127]
D(PX(-3))	-0.148492	1.345477	0.326882	0.132767	-0.182258
	(0.22759)	(0.58268)	(0.59960)	(0.17029)	(0.23391)
	[-0.65245]	[2.30912]	[0.54516]	[0.77965]	[-0.77918]
D(PX(-4))	-0.276504	1.256973	0.617751	-0.159375	-0.244556
	(0.18882)	(0.48343)	(0.49747)	(0.14129)	(0.19407)
	[-1.46435]	[2.60010]	[1.24178]	[-1.12803]	[-1.26015]
C	-0.063327	5.925570	0.013157	1.329370	-0.192148
	(0.78280)	(2.00415)	(2.06236)	(0.58572)	(0.80454)
	[-0.08090]	[2.95666]	[0.00638]	[2.26962]	[-0.23883]
R-squared	0.587787	0.762657	0.611848	0.563079	0.627724
Adj. R-squared	0.083972	0.472572	0.137440	0.029065	0.172721
Sum sq. resids	124.0867	813.3572	861.2925	69.47174	131.0754
S.E. equation	2.625586	6.722091	6.917339	1.964571	2.698511
F-statistic	1.166673	2.629078	1.289710	1.054427	1.379603
Log likelihood	-80.87835	-119.4222	-120.5962	-68.98711	-82.00159
Akaike AIC	5.067236	6.947427	7.004690	4.487176	5.122029
Schwarz SC	6.028509	7.908699	7.965963	5.448448	6.083301
Mean dependent	0.258664	0.658576	-0.408030	0.651659	0.312191
S.D. dependent	2.743292	9.255987	7.448084	1.993759	2.966868

Determinant resid covariance (dof adj.)	72017.40
Determinant resid covariance	1174.575
Log likelihood	-435.7900
Akaike information criterion	27.35561
Schwarz criterion	32.57991

VECM Result for Togo

Vector Error Correction Estimates

Date: 11/29/18 Time: 08:22
Sample (adjusted): 1975 2015
Included observations: 41 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	CointEq2	CointEq3	CointEq4
PSC(-1)	1.000000	0.000000	0.000000	0.000000
DBT(-1)	0.000000	1.000000	0.000000	0.000000
IN(-1)	0.000000	0.000000	1.000000	0.000000
M3(-1)	0.000000	0.000000	0.000000	1.000000
PX(-1)	0.005761	3.480395	0.047466	0.480810
	(0.19164)	(0.90065)	(0.17393)	(0.35084)
	[0.03006]	[3.86431]	[0.27291]	[1.37045]
C	-22.29935	-471.0785	-11.10900	-86.84511

Error Correction:	D(PSC)	D(DBT)	D(IN)	D(M3)	D(PX)
CointEq1	-0.405467	5.592329	0.069335	-0.369294	-1.258828
	(0.33668)	(1.59811)	(0.75083)	(0.45247)	(0.46912)
	[-1.20429]	[3.49933]	[0.09234]	[-0.81618]	[-2.68340]
CointEq2	-0.088711	0.014000	0.127138	0.005810	-0.184443
	(0.02333)	(0.11074)	(0.05203)	(0.03135)	(0.03251)
	[-3.80253]	[0.12643]	[2.44374]	[0.18531]	[-5.67415]
CointEq3	-0.108350	-3.330801	-0.652633	0.153327	0.539617
	(0.27383)	(1.29974)	(0.61065)	(0.36799)	(0.38153)
	[-0.39569]	[-2.56266]	[-1.06875]	[0.41666]	[1.41434]
CointEq4	0.378870	-3.709480	-0.340723	-0.014938	0.809308
	(0.21062)	(0.99973)	(0.46969)	(0.28305)	(0.29346)
	[1.79884]	[-3.71049]	[-0.72542]	[-0.05277]	[2.75778]
D(PSC(-1))	-0.338186	-5.264189	1.627042	0.303090	0.099902
	(0.43337)	(2.05705)	(0.96645)	(0.58240)	(0.60384)
	[-0.78036]	[-2.55909]	[1.68353]	[0.52041]	[0.16545]
D(PSC(-2))	-0.283456	-2.058171	1.665686	0.728969	0.264020
	(0.39537)	(1.87667)	(0.88170)	(0.53133)	(0.55088)
	[-0.71694]	[-1.09672]	[1.88918]	[1.37197]	[0.47927]
D(PSC(-3))	-0.534243	-2.176637	0.959855	0.372525	0.069955
	(0.33222)	(1.57694)	(0.74088)	(0.44647)	(0.46290)
	[-1.60808]	[-1.38029]	[1.29556]	[0.83438]	[0.15112]
D(PSC(-4))	0.105452	-1.541348	0.913566	0.857325	-0.389103
	(0.27687)	(1.31419)	(0.61743)	(0.37208)	(0.38577)
	[0.38087]	[-1.17285]	[1.47962]	[2.30415]	[-1.00864]
D(DBT(-1))	0.061718	-0.338154	0.033529	0.009256	0.190903
	(0.05272)	(0.25026)	(0.11758)	(0.07086)	(0.07346)
	[1.17057]	[-1.35119]	[0.28516]	[0.13063]	[2.59861]
D(DBT(-2))	0.021304	-0.561840	-0.019640	-0.013045	0.170052
	(0.05336)	(0.25329)	(0.11900)	(0.07171)	(0.07435)
	[0.39924]	[-2.21819]	[-0.16504]	[-0.18190]	[2.28716]

D(DBT(-3))	-0.047883	-0.440317	0.163177	-0.023615	0.141918
	(0.04952)	(0.23504)	(0.11042)	(0.06654)	(0.06899)
	[-0.96702]	[-1.87341]	[1.47772]	[-0.35488]	[2.05698]
D(DBT(-4))	0.058650	-0.280624	0.093812	0.094710	0.054070
	(0.05128)	(0.24342)	(0.11436)	(0.06892)	(0.07145)
	[1.14367]	[-1.15286]	[0.82030]	[1.37426]	[0.75672]
D(IN(-1))	0.220682	2.340417	-0.410254	-0.310124	-0.653450
	(0.27749)	(1.31712)	(0.61881)	(0.37291)	(0.38663)
	[0.79529]	[1.77692]	[-0.66297]	[-0.83164]	[-1.69011]
D(IN(-2))	0.236246	2.300663	-0.475687	-0.264785	-0.360033
	(0.24387)	(1.15757)	(0.54385)	(0.32774)	(0.33980)
	[0.96872]	[1.98749]	[-0.87466]	[-0.80792]	[-1.05955]
D(IN(-3))	0.128705	0.922321	-0.561412	-0.395323	-0.034226
	(0.17414)	(0.82660)	(0.38835)	(0.23403)	(0.24264)
	[0.73907]	[1.11581]	[-1.44562]	[-1.68920]	[-0.14105]
D(IN(-4))	-0.013342	0.342198	-0.056467	-0.208655	0.009434
	(0.09938)	(0.47171)	(0.22162)	(0.13355)	(0.13847)
	[-0.13426]	[0.72543]	[-0.25479]	[-1.56232]	[0.06813]
D(M3(-1))	-0.128517	4.349676	0.277260	-0.140597	-0.557550
	(0.28461)	(1.35094)	(0.63470)	(0.38248)	(0.39656)
	[-0.45156]	[3.21975]	[0.43684]	[-0.36759]	[-1.40597]
D(M3(-2))	-0.053186	2.904432	-0.742019	-0.118134	-0.697912
	(0.28853)	(1.36952)	(0.64343)	(0.38775)	(0.40201)
	[-0.18434]	[2.12076]	[-1.15322]	[-0.30467]	[-1.73604]
D(M3(-3))	0.273697	2.867753	-0.530942	0.107545	-0.656932
	(0.29459)	(1.39830)	(0.65695)	(0.39589)	(0.41046)
	[0.92908]	[2.05089]	[-0.80819]	[0.27165]	[-1.60047]
D(M3(-4))	-0.044969	2.161200	-0.299905	-0.089834	-0.202635
	(0.26070)	(1.23746)	(0.58139)	(0.35036)	(0.36325)
	[-0.17249]	[1.74647]	[-0.51584]	[-0.25641]	[-0.55784]
D(PX(-1))	0.313123	1.861798	-0.427428	-0.160273	-0.617051
	(0.18757)	(0.89033)	(0.41830)	(0.25208)	(0.26135)
	[1.66934]	[2.09112]	[-1.02183]	[-0.63581]	[-2.36100]
D(PX(-2))	0.353005	1.965859	-0.900660	-0.281671	-0.042084
	(0.19351)	(0.91852)	(0.43154)	(0.26006)	(0.26963)
	[1.82422]	[2.14025]	[-2.08708]	[-1.08312]	[-0.15608]
D(PX(-3))	0.354689	1.106598	-1.289165	-0.265349	0.216408
	(0.16713)	(0.79332)	(0.37272)	(0.22461)	(0.23287)
	[2.12218]	[1.39489]	[-3.45880]	[-1.18138]	[0.92929]
D(PX(-4))	0.117931	0.174942	-0.460616	-0.321071	0.199478
	(0.13273)	(0.63003)	(0.29600)	(0.17838)	(0.18494)
	[0.88849]	[0.27767]	[-1.55613]	[-1.79997]	[1.07861]
C	0.564134	-5.587112	-1.083202	0.384935	2.944972
	(0.62125)	(2.94885)	(1.38543)	(0.83489)	(0.86562)
	[0.90806]	[-1.89468]	[-0.78185]	[0.46106]	[3.40217]
R-squared	0.774343	0.754213	0.920876	0.647504	0.925174

Adj. R-squared	0.435858	0.385533	0.802191	0.118760	0.812936
Sum sq. resids	131.3016	2958.276	652.9871	237.1341	254.9088
S.E. equation	2.864672	13.59751	6.388403	3.849790	3.991466
F-statistic	2.287670	2.045713	7.758951	1.224608	8.242925
Log likelihood	-82.03693	-145.8917	-114.9202	-94.15508	-95.63682
Akaike AIC	5.221314	8.336179	6.825375	5.812443	5.884723
Schwarz SC	6.266175	9.381040	7.870236	6.857304	6.929584
Mean dependent	0.603223	0.141637	-0.939226	0.749381	1.524622
S.D. dependent	3.813999	17.34644	14.36378	4.101002	9.228624

Determinant resid covariance (dof adj.)	6299261.
Determinant resid covariance	57012.52
Log likelihood	-515.3784
Akaike information criterion	32.21358
Schwarz criterion	38.27378